COMMUNICATIONS WORLD

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Optic fibres muscle in on satellites

SYDNEY — Competition from optic fibre cable in the US had literally pushed companies associated with satellites to implement more appropriate applications, according to Andrew Werth, a director of Microwave Associates Australia Pty Ltd.

The big advantage of satellites over the next 10 years would be their ability to service endusers direct, something which was not practical in the old classical sense of providing heavy duty traffic trunks, he said.

Such traffic carriage had been invaded by optic fibre cable.

Werth, senior vice-president of M/A-Com of the US, represents that company on the board of MAA. M/A-Com has a 45 per cent interest in MAA.

He was visiting Australia because the Australian Industry Development Corp was taking up a 25 per cent interest in MAA.

Other shareholdings are held by Codan Pty Ltd, Adelaide, which has a 25 per cent interest; and 5 per cent is held by Anthony Staley, a former Federal Minister for Post and Telecommunications, who formed the company.

MAA, formed to operate in the satellite communications market, particularly in earth stations, expects to have a turnover of $A7 million this year.

Orders have been received from AAP Reuters Communications Pty Ltd for earth stations and from OTC for a digital switch imported from another US manufacturer. Telecom is trying out a terrestrial point-to-multipoint microwave system.

Werth said M/A-Com, a lead-

(Continued page 4)

Ian Smith is one of the new breed of managers, specifically looking after the diversified and large telecommunications requirements of Australia's largest motoring organisation, the NSW-based NRMA. See: Management — page 29.

Voice mail is booming

MELBOURNE — Interest in voice-messaging has grown in leaps and bounds in Australia since AAP Reuters Communications introduced the Aspen voice mail switch — and even Telecom has "put a toe in the water".

According to AAP's assistant marketing manager, southern region, David Blanks, a working group has requested voice mailboxes on the Aspen computer to see what such a system can do for Telecom's own internal communications.

Blanks said there had been "huge interest" in computer-managed stored voice messaging, with more people being put on every day as organisations conducted field trials on the evaluation machine installed in Melbourne. The number of mailboxes in use was growing by the hour.

Because people almost invariably asked whether the Aspen stand-alone system had Telecom approval, Blanks stressed once more that not only did it have the approval but that its installation should be regarded favorably by Telecom because of quicker call completion and better PSTN utilisation.

■ **Full report — page 4.**

Harder choice for PABX users

NORTH SYDNEY — The possible doubling of the number of PABX suppliers in addition to added functions in the units would make the choice of appropriate equipment more difficult for users, according to David Osgood, of Logica Pty Ltd.

Osgood, senior consultant in telecommunications with the consultancy group, said another five suppliers could be expected to arrive in Australia following Telecom's opening up of the market with its changed policies.

These five, together with two new arrivals in the commercial sector, IBM and Telecom, could see some 14 suppliers battling for market share compared with seven previously.

However, as it had been estimated that a supplier would require a 10 per cent share of the market to be viable, it was likely that some suppliers would eventually drop out.

David Osgood . . . five more suppliers

Osgood was the leader of a Logica team which put together a comprehensive report, *Digital PABXs in Australia and New Zealand — The Next Five Years,* scheduled for publication in early March.

The report is said to cover issues that managers must consider if they are to plan successfully for the future and to select, implement and maintain their systems in an efficient manner.

Osgood said Logica believed that, unlike the small business systems market covering Telecom's Commander range, the market opportunities for PABX suppliers would reside more in replacing the installed base rather than expansion into new accounts as most organisations which required a PABX had already obtained one.

PABXs now were not simply a means of handling telephone traffic but were incorporating more and more functions, adding

(Continued page 4)

Aussat shifts to second phase

SYDNEY — Aussat Pty Ltd is entering the second phase of marketing facilities available on its first generation of satellites and is also preparing for the launch in 1991 of the second generation.

Both events will allow participation by the Australian telecommunications and electronics industries.

The initial marketing efforts for the two satellites already launched and the third soon to be launched have been directed to large capacity users.

A spokesman said the company was now also directing its attention towards providing facilities for potential customers whose transmission requirements were less than that provided by one of the transponders on the satellites.

Aussat has requested proposals to help it provide a range of high-quality and cost-effective data and voice products in three broad areas: star network services, mesh network services and capital city network services.

New services

Aussat wants to know what suppliers of products and services could come up with.

Aussat is also calling for expressions of interest from suppliers for the manufacture of its second generation satellites, satellite control facilities and associated equipment.

The second generation will provide replacement communications capacity for the first generation and prospectively a range of new communications and other satellite related services.

Specifications would be circulated for comment prior to the call for tenders in mid-1987 with finalisation of contract due to be completed by mid-1988.

A basic design concept was being developed which could include, for consideration, a number of additional applications including meteorological capability, remote sensing, mobile communications services and scientific applications.

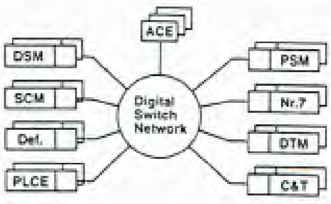
The spokesman added that Aussat would like to see Australian companies participate more in this second generation than was attained for the first.

INSIDE

Colin Spinks explains how General Electric Information Services, one of the original computer service bureaus in Australia, is changing over from providing remote processing for its clients to more telecommunications-based products. — Page 8

Open Systems Interconnection offers the most attractive potential of making life much easier for computer users by allowing different computers to be connected without the traumas experienced now. Warwick Ford, Csironet, explains the progress in the developments of the standards and his network's own experience. — Page 9

The coming of Integrated Services Digital Networks will provide a tremendous boost to telecommunications users by the one media carrying voice and non-voice traffic. Mark Stevens of Consultel explains. — Page 10



Optical fibre cabling is being rapidly accepted as a viable economic alternative to microwave and satellite links in providing high traffic volumes over long routes, but Frank O'Brien explains how this comparative new technology has other important applications such as in manufacturing and process control. — Page 20

J N Almgren is a long established and highly regarded Australian manufacturer of telecommunications equipment with one of its latest products being the AS100 multiplexing/switch device with wide applications. — Page 21

Aussat puts forward the case for considering its satellite services vis-a-vis Telecom's terrestrial service. — Page 25

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'Ignorant' CEOs risk losing all

NORTH SYDNEY — Chief executive officers who neither understood nor appreciated information technology would be increasingly likely to lose control of their companies either by internal management restructure or outside takeover.

An executive director of Focus Research Pty Ltd, Adrian Wood, said work recently conducted among manufacturers suggested information technology tended to be a blind spot among top executives.

However, some executives were now realising the "hard way" that this technology was a strategic component essential for business survival.

Wood said this when announcing a new service, Comtec, which will track the development and implementation of communications technology.

Communications underpinned information technologies necessary for development and implementation of corporate strategies, he said.

These strategies could be divided into three sectors where:

- Computers and communications were used to provide facilities direct for clients such as automatic teller machines and airline reservations.
- Information technologies were used to reduce costs and improve office management.
- Technologies could facilitate forward planning by senior executives by bringing together the information available from internal sources, including that provided by customer services and administration and from external sources such as exchange rates and reports on the economy.

Benefits, problems

Wood said executives should be able to grasp both the underlying general principles of information technologies, the changes in technologies and the ensuing benefits as well as problems.

The technology sectors to be covered by Comtech are:

- Wide area telecommunications. Data networks including satellite radio, terrestrial media, switching systems, modems, multiplexers and network gateway services.
- Electronic mail.
- Local area networks.
- Videotex.
- PABX.

Wood said the first study would be produced in March and then every six to eight weeks and aimed at suppliers, end users, consultants and legislators.

The annual subscription of about $A4500 would cover not only the reports on each of the five sectors but also a cross-reference and index, report set library binder, and an annual inhouse roundtable consulting session.

Fibre optics course

FIBRE optic systems house, Integral Fibre Systems, (IFS) will again present a course on this subject in Sydney, Melbourne and Canberra in May and June next to meet the requirements of communications equipment suppliers, consultants and technical personnel.

Course leader, John Wise, IFS, will be assisted in module 1 by Dr Paul Bryce, Institute of Technology and in module 3 by Ross Halgren, AWA Ltd.

Enquiries: Bruno Buras, IFS, 6/19 Rodborough Rd, Frenchs Forest, NSW 2086. Tel: (02) 451 7033.

R&D tax aid praised

NORTH SYDNEY — The Federal government's recent tax initiative providing a 150 per cent deduction for research and development has been welcomed by the retiring managing director of Plessey Pacific Pty Ltd, Bruce Goddard.

"It should have been done years ago," he said, "but thank God it has been done now."

However, Goddard also sounded a warning: "You do not produce results immediately, it takes a minimum of at least two years.

"The problem is that someone will review the scheme in a year's time and cancel it because of a lack of apparent results. You have to give time for such policies to come to fruit."

Goddard, who has been with Plessey for more than nine years, has been appointed deputy chairman and will also act as a company consultant.

He said Telecom's new policies on PABX systems, requiring among other things a high level of Australian content and the carrier's calling for expressions of interest in supplying workstations and other equipment, were some of the important changes now affecting the telecommunications industry.

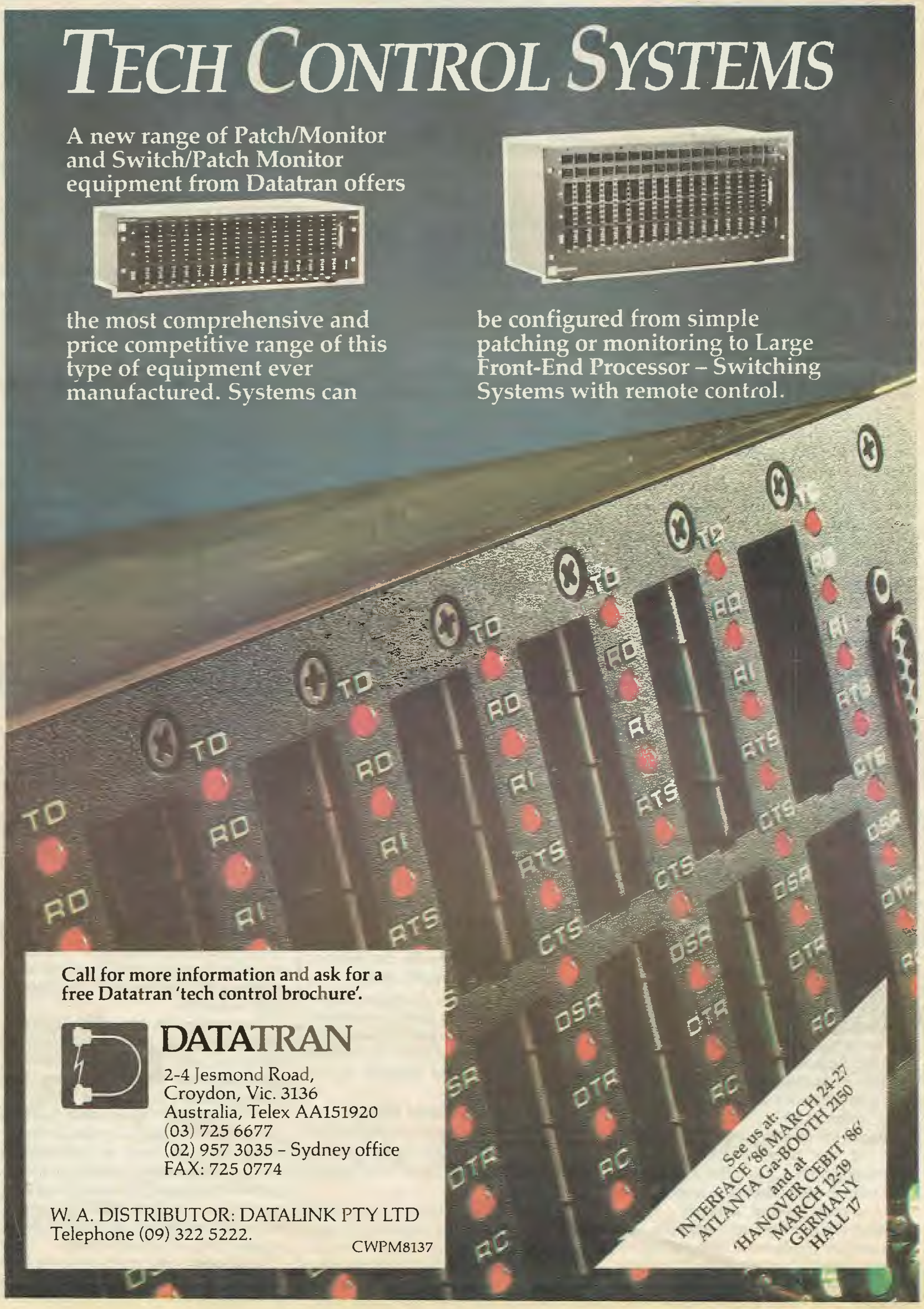
Goddard, who was recently president of the Australian Electronics Industry Association and of the Metal Trades Industry Association, said he believed Australian manufacturing was a mixture of both desperation and hope.

Many companies within the telecommunications industry had built new plants and had introduced new techniques to make them more competitive. This would result in an encouraging increase of exports.

On the other hand, other sections of industry were becoming desperate with the continuous rise in wage costs.

One of the setbacks for research and development in Australia has been a brain drain with insufficient suitable work available here, Goddard said. Plessey itself was attacking this problem by setting up a R&D company and intends to broaden its relationships with tertiary institutions.

On commercial operations, Plessey has moved to provide total systems rather than the individual components as the complexity of individual technologies requires a large degree of skill and knowledge to successfuly integrate the various components.



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Voice mail arrives in Australia

By Luis Huesch

SYDNEY — Eat your heart out, all you providers of electronic text message systems: voice mail has arrived in Australia. It is called Aspen (for Automatic Speech Exchange network), has an American accent (temporary — the US actress is being coached in the proper Australian pronunciation of her polite prompts) and is destined to wipe out memos and do away with the counter-productive executive game known as telephone tag.

Voice mail messages can be sent to multiple recipients, rerouted to phone numbers the system is told about, be expedited or delayed, annotated and copied by others or designated private and confidential so that even your private secretary does not hear more than the message "envelope".

"Envelope?" Yes indeed: should you hanker after envelopes, all is not lost in this latest electronic exercise — you get to hear not only the actual voice message delivered to your disk-bound mailbox, but on demand you can obtain its "envelope", that is, information about who sent the message from where and when.

With all this you are promised hard cash savings on telephone costs that can pay for the $A90,000-$A350,000 investment in voice mail within two years, according to vendors — and that is not counting the soft dollar benefits of greater productivity and streamlined corporate communications.

No wonder that some local enterprise should wake up to its potential for value-added services here. And it seems only logical that a small but ambitious communications company with powerful media backing should have hit upon a leading-edge product and signed up as its sole Australian marketer.

AAP Reuters Communications Pty Ltd of Glebe, Sydney, which beams microwave services such as Corporate Report into the business world from Centrepoint Tower, sent its talent scout David Blanks to the US some 18 months ago to look at the voice mail market.

There was a new startup company that seemed to have the goods, Octel Communications Corporation of San Jose, California. Three generations of hardware later, AAP assessed Octel's Aspen as "leading edge" and "the best available", and signed up the distributorship as Aspen's first international dealer.

Aspen branch which can handle up to 600 mailboxes.

Octel has grown more than 50 per cent in its 18-month existence, during which it snatched 18 per cent of the competitive US voice mail market.

Its technology is not just that of "a glorified answering machine", according to AAP Reuters Communications' general manager Barney Blundell. Nor is it built around some general-purpose computer or simply an extension module for PABXs.

It is "purpose-designed to provide affordable multi-featured voice messaging with emphasis on ease of use," Blundell said when demonstrating the system to reporters recently.

Aspen, which comes in economy and business-class versions, is intended to integrate with any PABX, whether analogue or digital, tone or pulse. If used via a pulse-dialling phone, users must employ a small $A25 tone dialler that supplies the required dial tones to the handset microphone.

Aspen will work with most switches now, but clients who wish to obtain the full range of Aspen functions including call forwarding, must wait until AAP has sorted out integration rights. Full PABX integration is possible with AT&T's Centrex switch and those made by Hitachi, Mitel, NEC, Northern Telecom and Rolm.

AAP, now sole vendor of standalone voice mail systems in Australia, is at present trying to tie up full PABX integration rights with NEC, which sells its own addon PABX module in the US. The NEC voice-messaging module (VMM) costs around $US160,000 and serves about 1000 voice mailboxes.

AAP is "not concerned in the slightest" about such addons, claiming they are "low on features and high on costs". In other words, as far as Australia is concerned, there is not a competitor in sight. This could change with the likes of Rolm/IBM now with a foot in the door of the local PABX market.

AAP's Aspen team, backed by more than half a century of combined Telecom experience, cleared the Telecom validation process in a swift three or four weeks, with just a few minor adaptations required.

For AAP, the Aspen venture is "a logical extension of our activities," said Blundell.

"It complements our terrestrial network and soon to be implemented satellite network."

Already, an unidentified "very large multinational company" has bought a system.

At least six others are "close to a decision", said assistant general manager Brian Perkins.

AAP itself is "looking at Aspen" for its own corporate purposes and a number of staff have trial mailboxes on the evaluation unit that is still in Melbourne. The experience so far is that Aspen has "wiped out memos," said Blanks, who heads the Melbourne end of Aspen operations as assistant marketing manager.

As a side benefit, AAP staff can now use any phone wherever they are as a dictation machine, calling up a dedicated mailbox from where typists or secretaries retrieve the text and type it out. The messages can be played back as slow or fast as they like without appreciably affecting voice pitch, and be halted or "rewound" at any place.

Aspen systems come in two versions. Aspen Branch is a small $A80,000-$A120,000 system capable of handling the voice traffic of between 50 and 500 mailboxes. It is not upgradable to expand user numbers beyond that limit, but is intended for small organisations and service providers who would hire out 10 or 20 mailboxes at a time to small companies.

The bigger Aspen can handle from 100 to 3000 mail boxes, with up to 9000 possible depending on usage patterns. It costs from $A105,000 to $A350,000, depending on the configuration, and can be expanded from one level to the next.

Leading edge technology from Octel

THE Aspen voice messaging system has been described as "leading edge technology" by former Telecom experts. It incorporates what Octel Communications Corp describes as its proprietary and unique "Intelligent Tone Detection", the ability to decode DTMF (Dual Tone Multi-Frequency) touchtones reliably even while there is voice on the line in the form of prompts or messages. By splitting the incoming data stream into voice and DTMF streams, Aspen can guard against the system mistaking voice signals for keypad commands, or ignoring touchtone commands because of voice interference.

Another feature said to be unique in voice mail systems is Aspen's ability to perform full error detection and error correction for the data exchanges between disk and CPUs while only cursorily checking the bit integrity of digitised voice transmitted between disk and line card. This technique is said to boost system throughput without affecting data integrity. And the fact that one controller is used for both purposes cuts down system price.

The system is modular and can be extended from four to eight ports and 6.4 to 12.8 hours of message storage on the smaller Aspen Branch and four to 24 ports and six to 632 hours or storage on the larger Aspen.

Configuration depends on the intended user group size and expected usage patterns.

Optic fibres muscle in

(Continued from page 1)

ing supplier of advanced satellite and other communications products, had developed "affordable" earth stations which could be installed on a user's premises.

Networks comprising hundreds of these "personal" earth stations were being installed in the US. Wal-Mart Corp, for example, was installing one at each of its retail outlets to send data to a central computer site for processing.

Further, the earth station could be used to receive video messages from corporate headquarters as well as being used for inter-company voice traffic.

Werth said that, while such devices and the accompanying network expertise could be used worldwide, the cost of the earth stations in Australia would be higher due to the adoption of the B-Mac standard, the only nation to do so.

One of the reasons for the relatively low cost of the personal earth stations, measuring from 1.2 to 1.8m in diameter, was volume production so Australia would have to pay for being "different".

MAA has been set up to develop and manufacture products for Australia and for export, taking advantage of the M/A-Com link. It also will market earth stations designed and developed by Codan.

Jim Bettison, executive chairman of Codan, said its products would complement the M/A-Com range.

Codan employs 300 people and has an annual turnover of $A15 million, with subsidiaries operating in New Zealand and the UK. More than 40 per cent of products are manufactured for export.

However, the flow of technology has not been one way from M/A-Com to MAA, said Werth, noting that one of the three engineers from MAA sent to M/A-Com for training had been involved in the development of the personal earth station.

A spokesman for the Australian Industry Development Corp said its investment in MAA had been prompted by the opportunities brought about both by Aussat's operations and export markets in the Pacific Basin region.

Further, the corporation had been attracted by MAA's access to M/A-Com's technology and experience, as well as Codan's proven experience in design and manufacture.

On the possible effects of the recent shuttle tragedy on the satellite industry, Werth said he did not think it would seriously affect the launching of communications satellites because rockets could perform the same launching tasks.

Harder choice in PABXs

(Continued from page 1)

to the difficulties of making the right decisions. A wrong decision, he said, could be potentially very costly.

Local area network facilities, except those required for very high speed data applications such as Cad/Cam, were tending to be merged more and more into PABXs bringing up the question of whether or not a separate Lan was necessary.

Further, PABXs which could handle ISDN traffic were being marketed and this particular function would become more prevalent with Telecom's introduction of ISDN networks.

This would mean that, by the 1990's, organisations would have to require many high-speed and specialist data lines to justify separate data links rather than routing all traffic through the PABX.

Accordingly, with these added functions and as PABX systems tended to be installed for some time, so reducing the amount of experience available to the appropriate manager, it was not easy for a user to get a modern PABX on stream. This was complicated by the number of suppliers with different offerings.

While larger companies were more often appointing managers to be responsible for telecommunications, they inevitably came out of the DP department with little or no experience in PABXs, Osgood said.

An added complication was that, whereas the switching element of crossbar or analogue PABXs represented 30 to 50 per cent of the cost of the overall system, this element in digital PABXs was as little as 2 to 3 per cent.

Combined with the trend for the cost of interfacing telephones to the PABX to be increasing in the newer digital systems, the cost of using the unit for data switching represented a smaller and more attractive fraction of the overall cost.

This data cost would drop even more when ISDN became used world wide and increased production reduced the cost of components.

Osgood noted that, while Telecom would continue to be the sole supplier to the small business system market — a market which was growing much faster than PABXs — the distinction between the two systems was becoming more grey.

Logica has been surprised by the prepublication response to its report.

The report, costing $A690, covers product developments, standards and regulatory issues, suppliers and products, market analysis and usage and planning.

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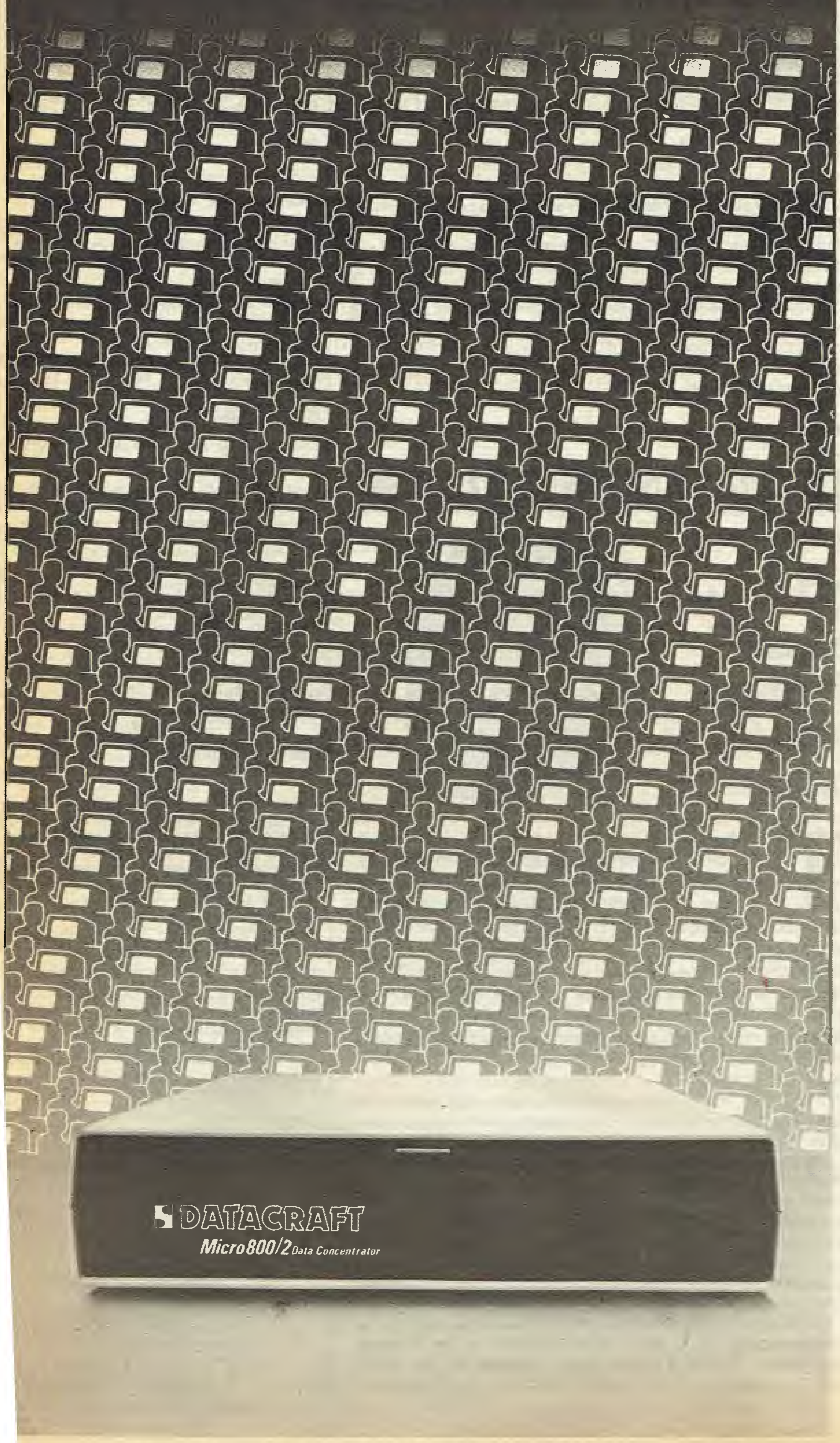

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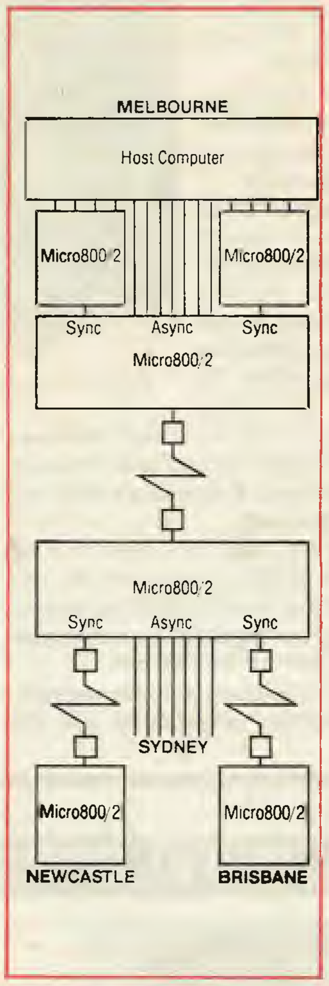

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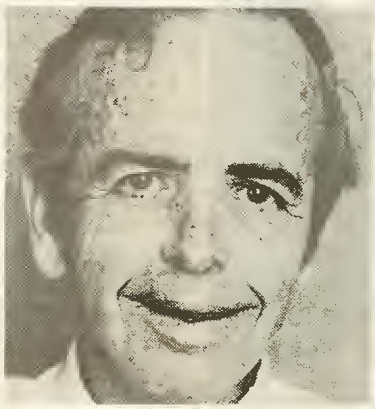
COMMENTARY

Challenging times

THE status quo is not only being challenged by those who want to curb the powers of statutory authorities It is also under attack from those who perceive that barriers operating in private enterprise are diminishing the advantages to be obtained from new technologies.

In an unusual, but effective, method of questioning most of the traditional national banks' attitudes towards electronic funds transfer systems, Electronic Funds Transfer Services Pty Ltd recently placed advertisements in national newspapers.


— *Noel Bennett,*
Editor, Communications World

The company which operates Austnet, Australia's largest operator of EFT systems, was protesting about the attitude of those banks who wished to control the EFT point of sale systems for their own benefit.

In the ad, the company said it was not on the lookout for more business but was arguing for competition and free enterprise and the benefits they could bring Australia.

The Minister for Communications, Michael Duffy, is in favor of competition, at least in world markets. When announcing the appointment of Charles Halton as the new secretary of his department, the minister said the times ahead could be a testing period for the department and agencies within his portfolio.

Duffy said the important issues included further improvements in telecommunications services throughout Australia and encouraging the competitiveness of Australia's telecommunications industry in world markets.

There are improvements: for example, the advent of Aussat and Telecom's drive towards ISDN networks and the use of optic fibre cable systems. But the ways in which Australian manufacturers may improve their competitiveness may not be entirely to the liking of the minister or to Telecom.

The Minister for Industry, Technology and Commerce, Senator John Button, has instituted an enquiry into the telecommunications industry.

While a report and recommendations have yet to be announced, it is interesting that officers of that department have roundly condemned Telecom's high-technology purchasing policy on the grounds that it fragments Australian industry and discourages standardisation.

Recent criticisms of Telecom go beyond this. The Australian Science and Technology Council has suggested that Telecom should be encouraged to continue to take more notice of the effect that its regulatory powers have on development of products by private industry.

Telecom might answer that it is doing its best for Australian industry with its present high percentage purchasing from Australian sources and that it is expanding in this area by, for example, seeking expressions of interest from private industry to provide it with work stations and other equipment for possible commercial marketing.

But the question arises over whether Telecom should be in the market for terminal equipment at all.

That aside, one of the perplexities of Telecom's attitude towards manufacturing and exports is contained in its new policy on the marketing of PABX's in Australia.

Suppliers are to secure at least 550 points out of a maximum 1000 points awarded for such activities as employment, investment in plant and facilities, local production and sourcing and "other". "Other" contains exports for which a maximum of 40 points can be obtained, leading to the inevitable conclusion that Telecom does not rate exports very highly.

If out of the present confusion and upheaval those organisations which have been granted virtual monopoly powers recognise the associated obligations, then the challenges which are pressing in on The Lucky Country may be met and overcome.

VIEWPOINT — A TELECOMMUNICATIONS FORUM

IAN CAMPBELL:

Just why Telecom is looking for OA 'partners'

TELECOM Australia is examining the feasibility of moving into the office communications systems market. It is seeking expressions of interest from companies wishing to enter into commercial agreements with it for the supply, merchandising and support of office communications equipment.

Telecom's general manager, commercial services, Ian Campbell, says the office communications systems would be multifunctional combining a range of integrated business communications and information management services.

"We are looking for companies with proven communications systems, a strong commitment to development, and an ongoing product strategy," he said.

"We will also be assessing technical suitability and commitment to international communication standards and widely accepted software standards.

"We are particularly interested in the marketing, sales and technical support available, costs and delivery times and, of course, commitment to an acceptable commercial relationship with Telecom."

"Telecom's charter requires us to meet our customers' needs with the best technological solutions which can be provided at economical prices.

"Joint merchandising ventures are one way for us to achieve this," he said. "It will combine Telecom's strengths in marketing, distribution and technical support with partners strong in high technology and manufacturing.

(Continued page 8)

WALLY ROTHWELL:

ATUG has mixed feelings over OA proposals

THE Australian Telecommunications Users Group (ATUG) views with mixed feelings the recent call by Telecom for expressions of interest from suppliers of what one might term the "Communicating Office". On the one hand, such an arrangement can be seen as the logical extension of the services provided by the telecommunications giant and on the other, concern is felt about some of the marketing and regulatory aspects of such a move. Is this a market grab or is it evidence of Telecom's feeling of social obligation to provide the latest and the best for Australian business, asks Wally Rothwell, ATUG's executive director.

It is indeed logical that today's automated office should be preparing itself for the advent of services like the Integrated Services Digital Network (ISDN), where voice, data, text and facsimile/graphics can flow through the same communicating channel. The feasibility of ISDN is with us already along with the many existing data services and Viatel, Teletex, E-Mail and Telememo. Thus, the efficiency increase in being able to avoid multiple handling of office information is augmented by providing workstation terminals, information processors and communicating links in one compatible, integrated system, which can communicate with the rest of the world in an instant.

Logical and timely as it might be for such a move towards the communicating office, one must ask whether it is just as logical that Telecom should be an accelerating force in this area. Much has been said this decade about the convergent technologies of

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COMMUNICATIONS WORLD

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Exporting begins at home

The Federal government is urging manufacturers to go out and export. Perhaps it may be prudent for those heeding this injunction first to pay close attention to the Australian marketplace.* Noel Bennett *talks with a founder and director of fast-growing Netcomm (Australia) Pty Ltd,* Chris Howells, *about exports and related topics of concern to those in the volatile area of telecommunications equipment manufacturing.

NETCOMM'S revenues growth is like an upward roller coaster; $800,000 in 1983-84, $A1.25 million expected for 1984-85 and about $A5.5 million predicted for 1985-86. And while the company could grow faster, management is most reluctant to do so, concerned with the effect on management structure, staff and "outside" interference from new investors.

The company's story began in the early 1980s when acting on the suggestion of the then Australian distributor of Apple computers, Rudi Hoess, Netcomm got in contact with Apple Inc, US. The company subsequently agreed to develop an interface card for the Apple II and III computers.

The Apple III did not figure strongly on dealers' shelves for long. Products developed included a Z-80 RS232 programmable interface, loaded into the Apple II through the disk drive. The interface allowed the machine to act as a compatible 2780, 3780 terminal or alternatively could handle 3270 bisynchronous applications.

However, Apple's main interest was the interface card for the Apple II to enable it to handle SNA SDLC protocols. Developed around a Z-8 chip, this device had more Ram and Rom and was faster than the Z-80-based device.

Chris Howells . . . "world-beating product"

Under the agreement, Netcomm was to manufacture the Z-80-based Apple II device and Apple Inc, the Z-8 product under licence.

At that time, in 1983, no other organisation had developed a communications protocol similar to Netcomm's Apple products, according to Howells.

At about this time Apple released its IIc and Macintosh models and had reoriented its thinking about how to go about communications products and as "there was little interest by Apple in our world-beating product."

Apple's changed attitude caused Netcomm to develop products specifically for the Australian market place. Howells notes it was interesting and at times hair-raising to work for a client some 8000 miles away. However, Howells said Netcomm did very comfortably out of the Apple deal and still has the rights to distribute the products outside the US, which it may now pursue.

The new philosophy adopted was that overseas contracts would be cream on business generated from its home base, Howells saying a company cannot export without a sound home base and "successfully play against the big boys overseas". Netcomm could be forgiven if it went into the home market with a certain degree of confidence. It had received a big boost working on the Apple contracts, learning it could match skills in its chosen area with any organisation worldwide.

The first product was developed in 1984 for connecting personal computers to bulletin boards, based on Netcomm's previous experience in working in the complicated synchronous world.

Essentially, this application was chosen as it was a volume market compared with the more advanced markets it has recently entered. To build on this volume market, Netcomm developed a rather sophisticated product for Apple II, II+ and IIe computers, the In/Modem. This internally mounted direct connect modem allows these products to directly use telephone lines to connect to most remote computers and services and includes advanced features such as auto-dialling and answer.

Then came the direct-connect PC In/Modem, a multi-function "super smart" modem for the IBM PC, PC XT and PC AT models. This modem also features Hayes Smartmodem command compatibility allowing the unit to handle IBM PC communications packages such as Crosstalk, Relay or multifunction application packages, for example, Symphony or Open access.

No other modem in Australia could handle all these applications (in the one unit), Howells said.

The PC In/Modem won the 1985 Australian Hardware Division of the Personal Computer of the Year Awards conducted by *Your Computer.*

Then, last June, Netcomm announced a new range of products, the Smart Modems to fulfil the demand for higher speed transmission on the public switched network coming from the personal computer market.

Howells considers these products to have been launched at the right time and at the right place. They were completely designed by Netcomm and are manufactured in Australia.

As Howells says, the development of these products in a very short time involved enormous learning curves.

The products are distributed through PC dealers, an efficient and more effective way of getting the products to market rather than the company retailing the product itself, says Howell.

Netcomm is talking to IBM Australia Ltd about those products specifically designed for its machines, but according to Howells, the company is not fully prepared to talk with the outside hardware world, as distinct from software vendors.

(Continued page 24)

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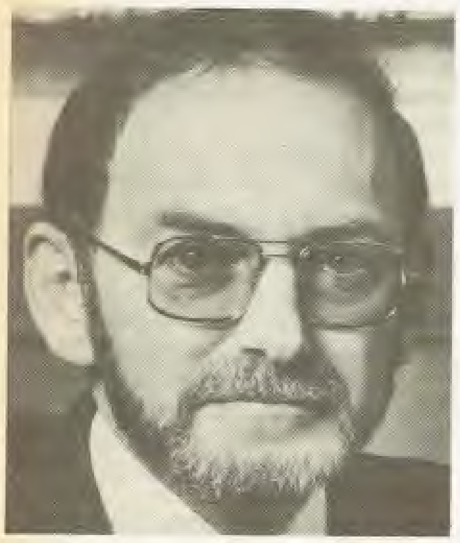
Emerging role for bureaus

Computer service bureaus in the 1960s and early 1970s tended to entice prospects with the argument that, as with large electric utilities, it was cheaper and easier for prospects to use very large centralised computers via telecommunication networks than for the prospect installing his own computing facilities. However, with the dramatic fall in hardware costs, this argument faltered. Accordingly, bureaus cast around for new opportunities including niche software markets and latterly, telecommunication services. Noel Bennett talks with Colin Spinks, marketing manager of General Electric Information Services, which was one of the earliest foreign-owned bureaus operating in Australia with the processing facilities resident overseas.


Colin Spinks . . . "user confidence"

BUSINESS opportunities for GEIS during 1986 appear to be particularly favorable with Colin Spinks saying from his Milsons Point office, Sydney, that the company intends to enlarge its workforce of 60 by another 10 or 12 people.

In a welcomed change in the business climate Spinks said: "Large corporations are ringing us up and more people are required to service them."

GEIS began its remote computing service, Mark 1, in 1968, based on the attraction that centralised computing power supplied by one organisation was cheaper than companies installing their own machines.

However, machine costs fell dramatically and the price-effectiveness of GEIS's service began to lose its appeal. The bureau then hitched its fortunes to providing specialised proprietary software, only available through its remote computing service.

In turn, this offering began to lose its attractiveness to many customers, not only with the ever-continuing price fall of computing power, but also with the emergence of expert software houses.

Further, some remote computing services came on to the market specialising in particular applications, providing a more comprehensive service.

In addition, Spinks says engineers, geologists and others tapped into GEIS's services sporadically. This discontinuous load made it difficult to predict revenue flows.

At this stage of the evolution of bureau services, some of the longer-established bureaus, including GEIS, recognised that the essential characteristic and strength of their offerings lay in telecommunications.

GEIS now tends to concentrate on multisite applications in a production environment. Revenues now generated from these sources are more stable and easier to predict so GEIS is able to better manage its business.

One example of multisite applications is WPXchange where groups of solicitors linked into GEIS's telecommunications facilities, provided by Telecom and OTC, can exchange data electronically. Word processors are linked together with the GEIS system taking care of the connection between word processors of different makes and models.

Spinks says his company is marketing another similar facility, Electronic Data Interchange, to businesses which could find electronic linkage more advantageous than mail for the exchange of documents. A third-party clearing house enables purchase orders, invoices and details of payments to be sent electronically between two or more companies, via the GEIS system.

GEIS has been quick off the mark with the explosion over the past few years in the financial services market, again concentrating on networking and providing information instantly, rather than offering large number crunching facilities as in the past.

The bureau has been heavily targeting the general financial and banking markets with its international network, providing information from overseas very quickly so that users can respond to extremely volatile markets more effectively and efficiently.

Services offering include cash management, global limits and exposures so that a corporate treasurer can obtain a listing of all subsidiary bank accounts and conduct funds and credit transfers.

"This says much about the confidence of these users in our ability to transfer their funds reliably," says Spinks.

Knowledge of the status of bank balances also allows treasurers to place funds on money markets, based on the information received from worldwide sources.

The software for these applications has been written by GEIS's systems development group to meet each client's specific needs and five major banks have responded to the system's attractiveness.

However, despite this emphasis on networking services, Spinks says GEIS still has "good clients" in construction and mining due to its "unique" software offerings.

One of the most potent forces in today's computing is the personal computer with Spinks believing owners will take advantage of what GEIS can offer. "Their appetites are being whetted," he says.

GEIS is now readying itself by developing appealing application software. Further, "friendly" frontends to GEIS network are being developed and in banking, the company is developing a treasurer's workstation with some of the processing being performed by the station itself, so lowering overall costs of GEIS's services.

In Australia, network control centres are in Sydney, Melbourne and Perth. Leased Telecom lines connect these centres as well as Adelaide, Brisbane and Canberra. Users have the option of connecting into the network via leased or dial-up lines or connecting through Telecom's Austpac packet-switching network.

> ‘**_Knowledge of the status of bank balances allows treasurers to place funds on money markets based on worldwide information_**’

Spinks notes the demand for Austpac has been stimulated by it reliability and acceptable response times. However, to fulfil demands of Perth clients in particular, IBM's SNA transmission architecture is available for those clients as well as others in Melbourne.

Sydney is the Australian hub of GEIS's international network communicating via leased OTC lines to Hong Kong and Singapore and GEIS Australia is responsible for this South-East Asian network.

In turn, OTC is responsible for the carriage of traffic to the West Coast of the US where lines then distribute the traffic to GEIS's prime message switching and processing facilities in Cleveland and Maryland. Another centre is located in Amsterdam.

The US centres contain Honeywell DPS 9 and 2000 mainframes, but the corporation has recognised that the overwhelming preponderance of US IBM computer users can no longer be ignored and so has installed large mainframes from this manufacturer.

In the US, carriage of telecommunications traffic is now fiercely competitive, particularly on long-haul lines. GEIS is now able to provide value-added network services enabling customers to use GEIS lines to connect into either GEIS or other hosts.

While some Australian organisations are taking advantage of the cost and broadcasting characteristics of Aussat's satellite services, GEIS has no intention of signing on at present.

Spinks' office overlooks a section of Sydney Harbour, but he says he rarely looks out on to this magnificent sight. In telecommunications jargon, the view has become transparent, an aim of GEIS with its networking so that customers do not know how the system operates, but that it is there whenever required.

VIEWPOINT

ATUG's mixed feelings

(Continued from page 6)

telecommunications and computers and Telecom's Computerphone is a good example, but where should the line be drawn and should Telecom, whose charter is "to plan, establish, maintain and operate telecommunications services", be exerting its marketing muscle in the information processing area, queries Rothwell.

ATUG is about choice for the telecommunications user, both private and business-choice.

While there is no suggestion that Telecom would attempt to deny competition from other suppliers for this project, the problem arises when Telecom enters the market at a price which is low enough to deny others in the market the ability to compete profitably. Telecom is able to offer such attractive prices, not only because of its huge buying power but also because it has the financial resources to back a low-priced market entry; and both users and suppliers alike only need to read the Telecom Annual Report's financial statement to realise that those financial resources are supported in part by funds which have nothing to do with marketing.

Why, one might reasonably ask, is ATUG complaining if a product is offered at a lower price by Telecom? A fair question indeed, but the difficulty occurs when others in the market can no longer compete and are forced to withdraw, leaving Telecom as the only supplier.

No one would seriously object to Telecom marketing telecommunications products if it could be seen to be competing fairly in the market. Thus, until a separate, autonomously funded arm of Telecom is set up to market products, there will always be doubt that fair competition exists, Rothwell says.

The only other concern about Telecom's entrance into this market is in the regulatory area. Telecom By-Law 219a provides that Telecom can refuse to connect any apparatus to the public networks which is "of a similar type . . . or providing a similar facility . . . or already available from the Commission's standard range of apparatus."

We would expect this by-law, onerous as it is, to be waived where work stations/information processors are concerned, as it was with Computerphone.

So the misgivings probably outweigh the acceptance of this move by Telecom. We accept that Telecom perceives its entrance into this market as offering a complete service to its customers which is probably more comprehensively integrated than others presently available and, initially at least, will be competitively priced. We have marketing reservations though.

Lastly, we would ask: if Telecom feels it can move into this area, why should it not reasonably release those product areas where it insists on a monopoly, like the standard telephone, telex teleprinters, and small business telephone systems?

Telecom's OA interest

(Continued from page 6)

"Telecom's business customers are becoming more aware of the benefits of an integrated rather than a fragmented approach to their communications and computing technologies."

He said the office communications systems would include integrated desktop workstations which provided computing and telephone facilities and access to external databases.

Networking of these workstations in the office would be an important feature of the systems.

He said Telecom's move into this area was a logical extension of its commitment to meeting customers' needs.

"The introduction of products such as Computerphone, Viatel, Teletex and Telememo were our first steps towards achieving this goal," he said.

Telecom now markets a range of office communications products such as Commander Systems and PABXs, and network services including Telememo, Teletex and Viatel. Any company wishing to join with Telecom on the new project would be expected to demonstrate its willingness to carry out development, if needed, to ensure interworking with existing products and services, enabling Telecom to offer integrated business communications to the Australian community.

Telecom is well on the way to introducing an integrated digital services network throughout Australia. When it is in place, it will provide a single pipeline, initially for business, for the transmission of voice, data, text and images.

It is expected that office communications systems will evolve to be able to use the integrated digital service network to gain the fullest advantage.

Campbell said that any commercial agreement entered into by Telecom was expected to cover a period of three to five years.

Further details on the information needed to be submitted with registrations of interest can be obtained from the senior supply officer, Commercial Supply Branch, telephone (03) 606 6629.

"Applications close at 2pm on March 11, 1986," said Campbell.

Pro-OSI lobby now in top gear

Open Systems Interconnection (OSI) is finally arriving and with it the promise of much easier interconnection of different computer systems from the many manufacturers. Warwick Ford, group manager, computer communications, Csironet, explains this new set of standards, how the objectives will depend on co-operation by the industry and how Csironet has kept very close to developments by spending much effort in devising ways of connecting unlike equipment for its network purposes.

AFTER several years of lead-up, Open Systems Interconnection (OSI) is about to arrive. Very soon the OSI standards will be taking their place in product offerings which support the networking of unlike computer systems.

OSI constitutes a set of communications protocol standards capable of supporting a wide variety of applications over a wide variety of underlying communications technologies. The protocol standards are based on the well-known seven-layer model.

At the bottom of the model are technology-dependent protocols, in layer 1 (Physical Layer), layer 2 (Data Link Layer), and the lowest sub-layer of layer 3 (Network Layer). At the top — in layers 7 (Application Layer), 6 (Presentation Layer), and 5 (Session Layer) — are the application-dependent protocols.

The bridge between these technology-dependent and application-dependent groups occurs in layer 4 (Transport Layer) and the remaining sub-layers of layer 3.

The OSI standards are being developed by the International Organisation for Standardisation (ISO). The CCITT is preparing, in parallel, a fully-compatible set of X-Series Recommendations for OSI.

Some of the OSI protocols have been defined for some time; for example, X.25 is a recognised OSI protocol for layers 1-3 for use over packet-switching telecommunications networks. Also the layer 4 and 5 protocols have been recognised ISO Standards and CCITT Recommendations since early 1985. However, true OSI communications are not possible until all seven layers are defined.

The uppermost two layers have taken longest to pin down. However, this month there will be momentous joint meeting of ISO experts in Paris. This meeting will produce the final texts for Draft International Standards (DIS) for the Presentation Layer and for two layer 7 standards — File Transfer Access and Management (FTAM), and Common Application Service Elements (CASE).

Growing evidence

When these standards reach DIS status in ISO, the first full-OSI implementations will be possible. These will be implementations supporting file-transfer applications. Layer 7 standards for Job Transfer and Virtual Terminal are also about to become Draft International Standards.

Of course, the fact that the standards organisations have produced the OSI specifications does not in itself mean the problems of interconnecting heterogeneous computer systems will disappear overnight. It is necessary first that the standards be accepted throughout the industry and that they be implemented by a sufficient range of equipment suppliers.

There is now mounting evidence from overseas that, not only will OSI be quickly accepted throughout the industry, but a great deal of pressure will be brought to bear on suppliers to provide the implementations rapidly.

In the US, the pro-OSI push is being led by the large industrial computer users, especially General Motors and Boeing. One result of this push was the Manufacturers Automation Protocols (MAP) demonstration last November, in which a number of prominent vendors combined in a live display of OSI-at-work, using those OSI protocols that were adequately defined at the time.

In Europe, there is a great deal of OSI support from governments and from European computer/communications manufacturers; the former recognising the user benefits of OSI and the latter seeing an opportunity to loosen the stranglehold of the traditional market dominators.

The UK Treasury Central Computer and Telecommunications Agency (CCTA) in 1984 issued a "statement of intent" foreshadowing OSI as a mandatory requirement in future UK government computer acquisitions, and it reinforced this statement in 1985.

As a consequence of customer pressures and/or of perceived market opportunities, most of the multinational computer vendors have now announced commitments to OSI and have foreshadowed OSI product releases. Special vendor consortia have also been set up, both in Europe and the US, to speed the production of compatible OSI products.

Csironet is one Australian organisation that has kept close to the OSI developments.

For 15 years Csironet has operated a heterogeneous computer network providing bureau-style computing services to its public-sector and (increasingly) private-sector clients throughout the country.

Host processors operated by the Csironet organisation itself span six different operating ssystems from four different vendors. The network also provides connections to a number of host processors operated by other organisations — these

(Continued page 28)

Warwick Ford . . . "quick acceptance for OSI"

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ISDN gains high priority

INTEGRATED Services Digital Networks are high on the list of Telecom's priorities as they are with other national carriers. Mark Stevens, senior engineer, Consultel Australia explains the features of this network and why telecommunications managers should take into account the forthcoming existence of such networks when making decisions today.

VOICE and data communications networks offer a variety of sophisticated services to the user. As the demand for improved and/or new voice and data services grow, the network must develop in a controlled and versatile manner.

The application of digital techniques to voice services has progressed to the point that sufficient commonality exists with data services to be able to share switching and transmission systems.

The flexibility of being able to allocate switching and transmission bandwidth between voice and data services can offer great cost benefits as well as allowing the type of versatility that would not be found in separate dedicated networks.

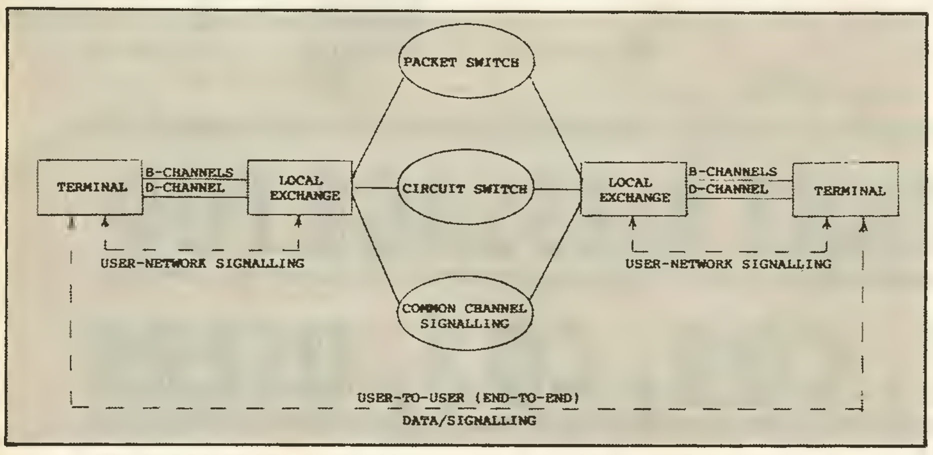

Figure 1: ISDN functional model showing the roles of B and D channels and user-to-user network signalling.

Today many sites multiplex voice and data traffic over common wide band (2M-bits/sec) services while third-generation PABXs can offer a concentrating and switching mechanism for data traffic.

The natural move towards integrating digital services has long been recognised at the international level. The CCITT has published draft recommendations and manufacturers are committed to development paths that ultimately lead to the Integrated Services Digital Network (ISDN).

The basic principle of the ISDN is the support of voice and non-voice services in the same network, over a limited set of multipurpose user interface arrangements and over a limited set of multipurpose bearer services. Such a network is seen to evolve from the telephony Integrated Digital Network (IDN) by progressively incorporating additional functions and network features so as to provide for existing and new services.

The user will see the ISDN as a network providing end-to-end digital connectivity for a wide range of services via a standard multipurpose customer interface. This interface will offer access via two 64K-bits/sec channels (called B channels) and one 16K-bits/sec channel (called the D channel). The B channels will cater for the voice and high speed data services while the D channel will be used for the access signalling and possibly low volume data services.

The migration of services from existing dedicated networks to an ISDN has implications for capital investment and utilisation of installed resources. Clearly such a transition could take one or more decades to accomplish.

The concept of an integrated network offers many functional and economical benefits. Service integration will result in more efficient and convenient communications resulting in greater utilisation of facilities.

Technical integration will result in lower installation and operating costs. The sharing of switching nodes and transmission links reduces the cost of duplicating these components for what is essentially similar types of digital networks. The integration of new services would also become less costly.

Many non-voice services would be enhanced by the availability of high speed digital access and transmission. For example, present day text transportation protocols typically operate at transmission speeds of around 2400 bits/sec. The fundamental ISDN transmission rate of 64K-bits/sec will significantly reduce the transmission time required for such services.

With the CCITT introducing standards for the developing ISDN, any new services can be assured of global standardisation and therefore a wide market base. This would not only encourage the development of newer, cheaper services but also forms a basis on which, in the long term, integration of individual broadband services could proceed. Ultimately, this would lead to the development of a broadband ISDN being capable of providing high speed data and broadcast services.

The type of signalling that the CCITT has defined for the ISDN offers great flexibility. The out of band access signalling can offer the ability to control multiple, simultaneous connections via a standard interface as well as the ability to change modes during a connection.

In principle, any digital network could be the root from which an ISDN may be developed; however, the widely based telephone IDN offers clear advantages over the other dedicated digital networks. The main point in the principle of the evolution is that each network uses as much as possible of the infrastructure from its preceding network so that only enhancements are necessary.

The evolution of the ISDN can be considered in a number of phases starting with a pre ISDN situation in which separate networks are dedicated to specific services.

The first phase of the evolution is the implementation of digital techniques to transmission and switching functions to produce a fully digital telephone network. As previously stated, this is the foundation of the developing ISDN and a phase which is well under way in Australia.

The next phase would be the provision of an integrated access to a variety of different networks. Such networks may include telephone switched networks, circuit switched data networks, packet switched data networks, domestic satellite networks, value-added networks and telex networks.

Once a standardised access has been achieved, then the incorporation into the network of the necessary functions and features of the dedicated networks that are appropriate for achieving the standardisation of the bearer services can proceed.

The ISDN will eventually evolve into a broadband service offering such facilities as broadcast-quality video telephony, broadcast-quality video conference, distribution of broadcast programs and high speed data transmission (up to 140M-bits/sec, for example Cad application). Note that the requirement to switch data streams at rates other than 64K-bits/sec (that is 32K-bits/sec DPCM, and 2M-bits/sec broadband switching) should not be ignored as a possible future requirement.

As the public networks evolve towards an ISDN, the private networks based upon the third generation PABX will display similar growth paths. PABX manufacturers are clearly committed to a development path that will lead to compatibility with the ISDN as defined by the CCITT. Just as the ISDN is seen to evolve from the telephone IDN, manufacturers have identified the need to develop the telephone PABX into a multifunctional system offering a variety of communication services. Such a system shall access the public ISDN over a standardised high speed link.

Third generation PABXs utilise digital technology to switch voice encoded into 64K-bits/sec PCM. The extensive digital networks built up for voice transmission serve naturally for data communications since there is essentially no difference between the two types of information. The digital telephone network therefore provides the option of a 64K-bits/sec circuit switched connection for voice and non-voice services.

Digital units (telephones, operators, consoles, terminals and so on) are connected to the PABX over 2 or 4 wire digital line extensions. Data terminals can be connected via digital telephones or by separate terminal adapters. In the former case, simultaneous and independent voice and data communications can occur over the digital line extension.

As with the telephone users, data terminals can be switched to various outgoing trunks through the PABX. In this fashion a larger number of data streams can be multiplexed together with voice streams over a common wide band transmission link. The PABX is providing a concentrating mechanism as well as a Telecom approved interface to the wide band service. Note, however, that the allocation of one 64K-bits/sec channel per data connection may prove an inefficient use of resources where the connection involves low volumes of traffic and long connect times. In such cases it could prove more effective to implement some form of data concentration prior to switching through the PABX.

Some PABX manufacturers also offer a number of value added modules to further enhance the data capabilities of their equipment. Such modules can form an integral part of the PABX and are accessed by the terminal on a switched basis.

An alternative approach in providing service integration is to focus on the technical integration of data communications nodes within the telephony IDN rather than continually expanding the functionality of the PABX. This approach would result in the data communications functions being handled by the dedicated nodes being accessed by the addressing mechanism in the telephony IDN. Therefore a data user connected to a PABX could address such a node to gain access to various specialised functions such as text store and forward or packet switching. This concept is in line with the evolution of the ISDN, namely the standard access to a number of networks.

Already on the market some manufacturers of third-generation PABXs offer what could be termed complementary data communications nodes. Such nodes service specialised functions and at the present stage of development tend to form separate, dedicated networks. What should be noted, however, is that there is a clear commitment by manufacturers to follow a development path that would ultimately lead to such nodes being technically integrated with the PABXs to offer users the benefits of service integration.

Such a development path is expected to last until the end of the decade and would take on the following form. The initial situation will allow terminal users to address various specialised nodes via the 64K-bits/sec circuit switch mechanisms available in the telephony IDN. This has two major shortcomings.

First, the network management associated with the specialised node cannot assemble statistics about the terminals connected to the PABX, only about the usage of the actual trunks.

Second, it is not possible from the node side to address individual terminals on the PABX.

To overcome these problems some form of common channel signalling is expected to be implemented between the PABX and the specialised node.

The final phase of this development path is expected by the end of this decade, and will involve the implementation of the full CCITT ISDN standards. Each terminal user, whether voice or data, will have access to a single interface.

The ISDN has been recognised by the international telecommunications community as being the logical evolution of the digital networks. Just as the public networks are planned to evolve, so too are the capabilities of the private digital networks. Corporate telecommunications strategies must consider this migration and evolution in order to ensure that their communications facilities will develop with the trend toward the ISDN rather than against them.

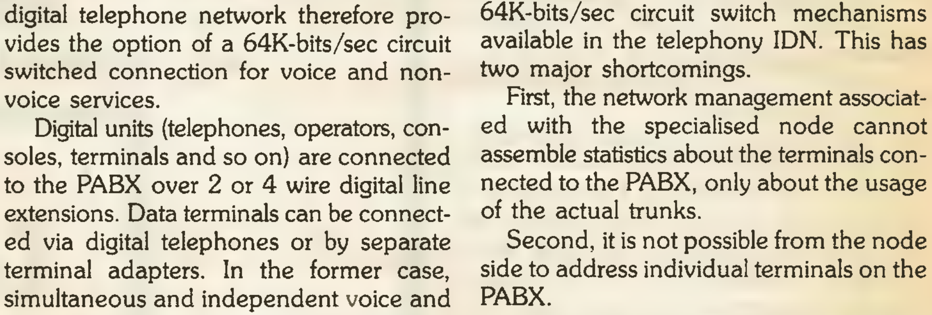

Figure 2: Voice/data PABX seen as the interface between the various outside networks and the internal functions.

Serious rival for faxing

By Stephen Coates

TELETEX, a public text interchange service, often called "super telex" may, in time, become a serious rival to facsimile for text and document transfer between business locations. Telecom plans to launch teletex in Australia at the end of this month.

Teletex is intended to provide a universal means of transferring text between different computer and word processing systems, using a common interface, protocol and command structure. It was standardised by the CCITT in 1980, and is based on the ISO 7 layer model, but it is the first application for which all seven layers have been specified. It was intended to be implemented as a public network and was designed to operate much like the telex network, but without many of the latter's limitations.

Teletex uses a set of 309 printable characters, far more than the 32 used by telex, plus 10 control functions. It operates at 2400 bits/sec full duplex, compared with 50 bits/sec half duplex for telex, and unlike telex, provides a buffering capability. In contrast to telex, teletex will not operate on its own physical network. The public switched telephone network (PSTN), the public packet switched network (Austpac in Australia), and a public circuit switched network can be used to access the service (Telecom does not offer or plan to offer a CSN).

Public teletex service was first offered in West Germany in 1981, and has grown significantly. In 1984, there were 10 per cent as many teletex terminals as telex terminals. Teletex service is also available in Austria, Belgium, Canada, Denmark, Finland, France, Italy, Norway, South Africa, Spain, Sweden, Britain and the US.

First release

Telecom's first release is scheduled for the end of March when two special AXE exchanges, one in Sydney, and one in Melbourne, will each have 1000 lines set aside for teletex. In Phase 2 of the project, to follow by the middle of the year, teletex lines will be available from AXE exchanges in all mainland capital cities, accessible from the just about anywhere within the local calling areas. Initially, access will be available only through dedicated lines, although Austpac access will be offered in Phase 2.

As has been done in most other countries, the teletex network will have an interface to the telex network, which will permit text to be transmitted from terminals on one network to terminals on the other. At the same time, the teletex network will also have access to Telememo, Telecom's computer-based messaging system.

These inter-network gateways are due to begin trials about the time teletex is launched, but there will not be full commercial availability until early next year.

A teletex line will cost $A150 installation plus an annual rental of $A900. Each teletex transmision during business hours will cost 16¢ for four seconds for distances of less than 165km, and 1.6¢ for two seconds for longer distances.

Teletex is often compared with telex, which it is tipped to eventually replace. With between 1 and 1.5 million units installed worldwide, 40,000 of them in Australia, telex has had a huge head start, but there are estimated to be 100,000 to 150,000 teletex machines installed worldwide at present. However, although there are only one-tenth as many teletex terminals as telex terminals, if West Germany's experience is any indication, they will carry a fifth as much traffic.

Although teletex was designed to permit the interconnection of word processing systems, standalone teletex terminals have sold well in countries with established teletex networks, perhaps because the computer manufacturers have been slow to offer teletex interfaces. Siemens Australia has already announced a teletex terminal, but has yet to specify its price.

Nevertheless, once teletex becomes established, it will be the teletex or facsimile question that will be given the most debate, and the winner, if there is to be only one, will not be so easy to pick.

The two methodologies have several similarities — they both operate according to CCITT standards, ensuring global compatibility, they both can use an ordinary telephone line, and can both be accomodated within the Integrated Services Digital Network (ISDN), when that finally begins to operate. They both use fairly modern technology.

Although the fundamental difference between the two is that teletex is a text switching system and facsimile is an image transmission methodology, it will be the difference in how they are used that will decide the eventual winner, again, if there is to be one.

Telecom expects there to be three basic applications for teletex:
☐ as a replacement for telex
☐ for general correspondence
☐ for special applications

Facsimile is being used for the same three general application categories, although the special applications differ. For example, teletex will probably be used for automatic notification of currency exchange rates, stock market quotations, commodity prices, weather forecasts, and so on. On the other hand, facsimile is at present, and will continue to be used for transmission of graphic material including maps, diagrams, plans, advertising layouts, and even photographs.

The battle will be over which will dominate for general correspondence.

Facsimile has the advantages that it can be easily implemented in a standalone configuration, can be operated by untrained personnel, and can transmit letterheads and signatures. A fax machine can be installed anywhere there is telephone service.

Of course, teletex, too, has its advantages. The network itself provides buffering, and can potentially include a store and foreward capability, which would eliminate

• *Stephen Coates is communications specialist with James Hardie Industries.*

(Continued page 25)

A TELEX DREAM COME TRUE

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FOXY

AUSTRALIA NOW HAS A PUBLICATION WHICH COMMUNICATES WITH PEOPLE INVOLVED IN COMMUNICATIONS

COMMUNICATIONS WORLD

INSIDE

Australia Square gets fibre optics facelift

Wired up and ready to go

Fujitsu plays it 'low-key'

Services export hope

OTC eager for more freedom

INFOTEX '85

Communications World is the preferred information source for managers of communications both within and outside the organisation. With data and voice communications merging, the old ways of managing the new communications technologies are changing. A new person is emerging we call the Communications Manager responsible for:

- ***Telecommunications:*** defined as data and voice traffic outside the corporate building. It involves liaison with services of Telecom, OTC, Aussat and bypass carriers.

- ***Office Communications:*** includes voice-only and internal-to-company communications; office automation; electronic mail; PABX; least-cost routing; liaison to finance.

- ***Network Management:*** local-area-networks; network security; node and link capacity planning; communications software packages. The Communications Manager is heavily involved here with DP strategies.

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OFFICIAL CATALOGUE

ATUG '86

Third Australian Telecommunications Exhibition and Conference

March 18-20, 1986

Southern Cross Hotel, Melbourne and Hilton International

• OPENING TIMES •

10am - 6pm	Tuesday
10am - 8pm	Wednesday
10am - 6pm	Thursday

Organised by Riddell Exhibition Promotions Pty Ltd
for and on behalf of The Australian Telecommunications Users Group

Published by Computerworld Pty Ltd in Communications World

Show doubling in size every year

TOWARDS the year 2000 could be a good theme for ATUG '86 as it is one of the few major high tech exhibitions to be held in Australia this year and the only exhibition on telecommunications. I can recall how pleased we all were with the first ATUG in '84 and ecstatic with ATUG '85, which was double the size. This year, the exhibition is almost double the size again.

Not many businesses in Australia can boast a 90-100 per cent, increase annually. This has been brought about by the tremendous developments taking place in telecommunications throughout the world and we in Australia are benefiting considerably. The very second our own satellite went into operation, the world shrank even more.

ATUG '86 is being presented for the benefit of all business people interested in saving time and money for greater business efficiency and profitability.

All exhibitors have something special to offer at this very important telecommunications exhibition. It is the only exhibition where all suppliers in the industry can be seen under the one roof and at the same time. Due to this I have very much pleasure in inviting you to attend the annual Australian Telecommunications User Group (ATUG) exhibition.

Once again it has been our pleasure to organise the exhibition on behalf of ATUG and all exhibitors. Don't let this once a year opportunity slip by.

Trevor Riddell

RCT Riddell,
Managing Director,
Riddell Exhibition Promotions Pty Ltd

Stand No 47

Australian Associated Press — Reuters Communications

351 Collins St, Melbourne 3000
Tel: (03) 619 9300.

ASPEN standalone Voice Messaging System and the M/A-Com Personal Earth Station communication products are displayed by AAP-Reuters.

Connected to the exchange line services or PABX, the Aspen provides a full range of electronic mail facilities using the telephone as a terminal device. Voice messages may be sent, received, distributed, re-directed, erased or stored as desired. All messages are user password protected. Messages can be notified to nominated telephone destinations such as office home or hotel. When integrated with a PABX, Aspen provides direct call forwarding to a mailbox together with activation of Message Waiting indicators.

Stand No 3

J N Almgren Pty Ltd

16 Smith St, Chatswood, NSW 2065.
Tel: (02) 406 6177.

NEW to the J N Almgren range of networking is the MP8000 launched here at Atug.

The MP8000 series, a multi-processor system for X-25 packet switching, offers increased throughput and high-speed bus connecting the controller board.

JNA is also highlighting Austpac/private networking, circuit switching and modems. The following products are featured; AS100 high-performance digital circuit switch, Develswitch contention and selection switch for over 2000 ports, SP8300 advanced X-25 pad processor, SP830 high performance pad, AS474 high-density modem system and the AS472 standalone auto answer V22 bis modem.

Stand No 34

Aussat Pty Ltd

GPO Box 1512, Sydney, 2001.
Tel: (02) 238 7894

AMONG the first to benefit from Aussat, with its two satellites already in orbit and a third to be launched later this year, are isolated communities where trials are under way for distance education through School of the Air. Many remote homesteads are receiving radio and television programs for the first time.

In cities, high speed data relay, videoconferencing and expanded television network links have become a reality. Government usage is being explored by the Department of Aviation which is testing satellite equipment for use in air traffic control. Emergency services are enhanced offered efficiency over land-based networks.

Stand No 43

AWA Networking & Business Communication

121 High St, Prahran, Vic 3181.
Tel: (03) 522 2211.

AWA, in conjunction with Northern Telecom, is showing the SL-1 Digital Switching PABX.

Northern Telecom is a major developer, manufacturer and supplier of telecommunications equipment and of intergrated information systems to private and government organisations worldwide.

It has supplied in excess of 18,000 SL-1 systems and a total of five million lines in 60 countries.

The AWA SL-1 is a stored program controlled (SPC) PABX using CCITT standard 32 channel pulse code modulation with single channel CODECS.

Stand No 44

Burroughs Ltd

324 St Kilda Rd, Melbourne 3004.
Tel: (03) 697 9222.

BURROUGHS joins with Australia Post to demonstrate a range of communications equipment designed for the office. Emphasis is on the B25 range of networked multifunction workstations.

Facilities on show include networking of workstations, an automated telex system, electronic mail, videotex and an interface to facsimile and data communications devices such as inhouse cabling systems incorporating fibre optics and uninterruptible power supplies.

Australia Post is demonstrating its E-Post electronic mail service with express delivery options.

Stand No 35

Datacraft (Aust) Pty Ltd

Maroondah Hwy, Croydon, Vic 3136.
Tel: (03) 726 9911.

ADDITIONS to the Datacraft product range including PC modems, distributed digital switches and the Micom Net Plus Local Area Network are seen at Atug.

Also displayed are modems, multiplexers, data PABXs, matrix switches and Pads, diagnostic equipment, Black Box catalogue products and a selection of electronic funds transfer equipment. Datacraft consultants will advise on topics ranging from office automation to international networks.

Stand No 14

Dataplex Pty Ltd

PO Box 541, Lilydale, Vic 3140.
Tel: (03) 735 3333.

DATAPLEX is an Australian data communications company specialising in the design and manufacture of local area data distribution equipment.

Products on display include a range of low-cost modems and multiplexers for use on Telecom's analogue circuits. Operational on the Dataplex stand is the DPX-7000 Optical Data Link, a recent addition in Telecom bypass technology and the DPX-224 multipurpose dialup modem.

Stand No 4

Datatran Pty Ltd

2 Jesmond Rd, Croydon, Vic 3136.
Tel: (03) 725 6677.

DATATRAN announces the release in Australia of the latest addition to the Avatar range of Protocol Converters.

The RPA2000 Protocol Converter increases the flexibility of the family of IBM 3270 terminals by offering access to asynchronous Ascii host systems while retaining the terminals' IBM capabilities.

The RPA2000 supports three modes of operation: Native 3270, Ascii Terminal, and Remote 3270.

In Native 3270, the terminal functions normally as it would when attached to its 3274/3276 cluster controller. In Ascii Terminal mode, the RPA2000 allows the terminal to emulate the DEC VT100 using the RS232C port of the converter for its asynchronous data transfers.

Stand No 66

Data Cable

538 Mountain Hwy, Bayswater, Vic 3153.
Tel: (03) 729 0044.

DATA Cable is an Australian company manufacturing and marketing electronic components, assemblies and associated products for applications ranging from industry to defence.

Displayed are fibre optic devices ranging from LED transmitters and pin detectors to wavelength division multiplexers, optical switches and point-to-point fibre optic modems.

Other products are fibre optic test equipment, locally-manufactured cable assemblies and a newly-developed word processing option for IBM typewriters called Typestore.

Stand Nos 45, 62

Delairco Group

214-220 Park St, Sth Melbourne, Vic 3205.
Tel: (03) 690 9722.

RICOH's high-speed G3/G2 series facsimile receivers are displayed by Delairco.

Shown are models: FX210 facsimile with one-touch dialling, send later, polling, 15-second transmission; FX230 incorporating FX210 features plus memory for broadcasting, send later, confidential memory, reception; FX5000 fully equipped main station G3/G2 facsimile, 15-second transmission with auto dialling plus; Saf Pak used in conjunction with FX5000 provides broadcasting capabilities, document memory, confidential, reception; FX120 small B4 size G3/G2 facsimile with 20-second transmission.

Stand Nos 6, 7

Digital Equipment Corp (Australia) Pty Ltd

Northern Tower, Chatswood Plaza,
Railway St, Chatswood, NSW 2067.
Tel: (02) 412 5252.

DEC is demonstrating its latest Lan teleprocessing technology for application in central site processing.

It also intends to demonstrate an IBM compatible PC working both interactively and transferring data files using DEC's latest Lan technologies to a local MicroVax II host which, in turn, is connected via land lines and satellite to a Vax and a SNA host in the US.

Stand Nos 15-20

L M Ericsson Pty Ltd

61 Riggall St, Broadmeadows, Vic 3047.
Tel: (03) 3011 400.

ERICSSON has on show a number of new products including the Eripax package switching system and its 605 telephone.

Also displayed is the Ericsson range of office and defence communications with emphasis on the MD110 third generation digital PABX. It features fully-voiced communication facilities for 100 to 10,000 users on local or remote sites.

Also displayed is the Ericsson communication package targeted at medium-size business incorporating the upgraded ASB30 telephone system, a new Cost Master call accounting device and the new Executive 605 telephone.

L M Ericsson is showing a number of its communications devices on Stands 15-20.

Stand Nos 57, 58

GEC Communications

2 Giffnock Ave, North Ryde, NSW 2113.
Tel: (02) 887 6296.

Stand Nos 29-31

James Hardie Communications

C/- Phone World, 78 Railway Rd,
Blackburn, Vic 3130.
Tel: (03) 878 1311.

A BUSINESS telephone designed as a PABX extension phone is shown by James Hardie. Features of the 7344 telephone are on-hook dialling, earth recall/hookflash, push-button dialling, last number redial, adjustable ringer volume, switchable tone/pulse dialling, nine memories and headset socket. Included in the James Hardie range of telecommunications attachments are domestic telephones, cordless telephones, telephone answering machines, telephone clock radios, automatic call diverters and super snap telephone accessories.

Interface of users and carriers

WHILE the advent of Aussat has provided new opportunities and options for telecommunications users, the vast bulk of this traffic is and will be carried by Telecom Australia. When public opinion was being canvassed as to whether Australia should have its own national satellite system, certain sections within Telecom were against the suggestion, believing the terrestrial network would be adequate for Australia's likely future requirements.

With Aussat now offering transmission facilities that either complement or compete with Telecom's services, Telecom has set about to change its image from an autocratic organisation to one approaching "sweet reasonableness".

There are other reasons for this change such as the privatisation of British Telecom, the break-up of AT&T in the US and other indications that deregulation or privatisation is becoming politically acceptable, at least overseas.

But Telecom has changed in other ways as well, offering more types of equipment than the simple telephone and value-added services on its networks such as Viatel.

Accordingly, Telecom is becoming more complex, operating in new fields which can have a greater impact on telecommunications users.

Just as in other areas of industry and commerce where it is felt participants' requirements should be formalised through a representative body, so the Australian Telecommunications Users Group (Atug) was formed to present the opinions of users to Telecom and the other carriers, Aussat and OTC.

Atug's executive director, Wally Rothwell, says most of the group's work involves talking and liasing with Telecom, the need to meet with the other carriers, Aussat and OTC, being relatively minor.

However, with the growing national importance of telecommunications Atug also meets the Federal government, in particular the Department of Communications and other associations "who have similar or opposing views to ours".

The importance of such work is illustrated by the steady growth of Atug over the past four years. It now has 265 members. Besides large users of telecommunications services, the membership also includes consultants and equipment suppliers.

Rothwell says that both Atug and Telecom have the same aims but that Atug has a different viewpoint from Telecom as the association looks at telecommunications with users in mind.

"Telecom has a strong social conscience, but sometimes I think it is over paternalistic which can lead to telling users what they want rather than (actually) listening to them," Rothwell said.

The relationship with Telecom is "friendly, but delicate," marked by mutual respect and co-operation. On the other hand, "neither side hesitates to say what it feels".

Rothwell says most Australians regard Telecom as being as competent as any other national carrier in the world, but there are some areas which Atug would like to see liberalised, as against being privatised or sold, as Atug believes the pertiment Telecom policies are "anachronistic".

The regulatory nature of some of Telecom's by-laws tended to restrict the choice available to users. Telecom itself markets terminal equipment and because of these regulations, suppliers are inhibited from introducing high-technology products to compete with Telecom's products.

Rothwell says it is not only the quality and range of products offered on the market which suffers, but also their price.

Further, while Telecom has tended to open up the market for PABX's by allowing new players to enter the game, subject to rather strict conditions, this equipment can only be maintained by Telecom and not by the suppliers.

Rothwell says that while Atug acknowledges that maintenance of PABX's is tied up with "industrial" matters, problems could arise with the possible entry of relatively large numbers of additional suppliers in the near future putting pressure on Telecom's resources.

Also, Atug is continuing to seek changes in Telecom's interconnect policy prohibiting the linking of privately-owned and maintained networks with the public switched network.

Atug believes this should be allowed, providing protocol and safety requirements are met.

On third party traffic, Rothwell says the introduction of Integrated Services Digital Networks over the next decade will make traffic flows so difficult to regulate that some relaxation in this area is likely.

Atug and other user and industry associations have suggested that a national telecommunications advisory council be formed, comprising representatives from such bodies as Telecom, Aussat, OTC and the Australian Standards Association.

According to Rothwell, the Minister of Communications, Michael Duffy, has rejected such a proposal as suggested by Atug, believing that any advice which could be proferred by such a body is available from his department and the various commissions covering the carriers.

However, Atug does not know just what advice the minister is receiving and whether Atug's suggestions are being heard.

Atug sees such a council as not having any kind of regulatory power. Rather it would be a forum for all interested sections of the industry, so ensuring that all parties would be kept abreast of what was going on and that voices of organisations such as Atug would be heard.

Atug informs its members of happenings and new policies in the telecommunications industry through newsletters and briefing sessions, but the association is coming to terms with the information age by setting up a videotex service on Viatel.

Further, policies to be adopted emanate in part from task forces, organised in Sydney, Melbourne and Perth, assigned to deal with particular issues. Special interest groups, the educational arm of Atug, meet every month.

While Atug is concerned to put its views before the carriers and the Department of Communications, it also seeks a broader audience.

Conferences/exhibitions such as this year's with the theme, Telecommunications Through the Looking Glass, is one way of attracting this audience besides providing members with the opportunity of viewing some of the most recent equipment available and listening to experts on contemporary telecommunications topics.

Stand No 13

Interquartz (A'asia) Pty Ltd

42 Dougharty Rd, West Heidelberg, Vic 3081.
Tel: (03) 459 1341.

THE INTERQUARTZ third generation telephone handsets have been designed to simplify operation of the latest PABX systems.

Sales engineers from the company's parent organisation in Hong Kong are on hand at Atug to outline the full range of Interquartz communication equipment, including its newly released personal business computer.

Interquartz telephone handsets are used in both large and small business and in leading hotel chains.

Stand No 5

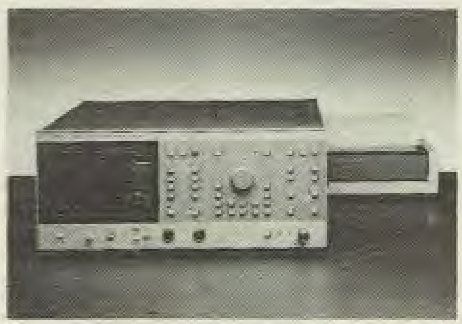
Kenelec (Aust) Pty Ltd

48 Henderson Rd, Clayton, Vic 3168.
Tel: (03) 560 1011

NEW RELEASE Wilton 6400 RF Analyser highlights the range of electronic test equipment displayed by Kenelec.

It is also showing Arium logic analysers, Data Precision waveform analysers and synthesisers, EIP microwave counters and generators, Hameg oscilloscopes and modular instruments, Wilton microwave network analysers, signal generators and components.

The 6400 RF analyser is a microprocessor-controlled combination signal source and scalar network analyser designed to make transmission, return loss and absolute power measurements from 1MHz to 2000MHz (in two versions) with a wide measurement dynamic range from +16 to −60dBm.



The Wilton 6400 RF Analyser Series 1 to 2000 MHz can be seen on Kenelec's Stand 5.

Stand No 70

Logica Pty Ltd

6th Floor, 157 Walker St, North Sydney, 2060.
Tel: (02) 957 1700.

THE LOGICA PABX Report, being launched at Atug, offers communication users an independent and comprehensive analysis of the field of information technology.

Logica telecommunications consultants are also on hand to advise on such topics as the design of packet switched networks, network design, PABX tender preparation and the functional specifications of an advanced message switch.

Stand Nos 37-41

NEC Australia Pty Ltd

649 Springvale Rd, Mulgrave, Vic 3170.
Tel: (03) 566 6555.

THE NEC Neax 2400 Information Management System, integrating such variables as PABX, computer and facsimile, is being launched at this year's show.

Features of the Neax 2400 is its modularity allowing facilities to be added as the company's communication needs expand. Also new to the market are Text Mail, Facsimile Mail and the IBM Compatible 3270 emulator.

Also introduced are two new facsimile transceivers. The Group IV Nefax D35 uses laser technology to transmit documents in just three seconds per page. The Nefax 11, designed for smaller business, offers transmitter subscriber identification, page number reporting and activity report.

Stand Nos 63, 64

Nokia Telecommunications

Makkylan Puistotie 1 PO Box 33,
ESPOO, FINLAND 02601.
Tel: 3580 51151.

PLANS to open a Melbourne office late this year preceeds Finland's Nokia Telecommunications to Atug '86.

Expertise in products ranging from information systems and dedicated networks to public and mobile telephone systems has seen the industrial group achieve an annual turnover of $US1,700 million.

Stand Nos 32, 33

Overseas Telecommunication Commission

32 Martin Place, Sydney, 2000.
Tel: (02) 230 5000.

MINERVA electronic mail system featuring security "mailbox" is displayed by OTC.

The Minerva uses the telephone network to send messages to personnel overseas, interstate or in the same building. The message is typed on a keyboard of a personal computer, word processor or typewriter.

Also on show is the Midas which uses keyboard and telephone network to access information from databases, to interconnect different types of computers and provide access to corporate computing facilities.

Stand No 55

OTT Telecommunications

PO Box 78, Tewantin, Qld 4565.
Tel: (071) 471 263.

THE INTERNATIONAL Telefax Directory, listing facsimile users in Europe, North America, Africa, Asia and Australia, draws attention to the OTT Telecommunications stand.

OTT is sole Australian agent for directory publisher Jaeger and Waldmann (J&W) of Germany.

Also on show is the International Telex and Teletex Directory listing 1.5 million subscribers. This eight-volume reference, published yearly since 1952, is used by OTC for its telex number inquiry service.

New J&W publication, Telex and Travel International can be seen at the OTT stand.

Stand Nos 21-26

Philips Communication Systems Ltd

Clarinda Rd, Clayton, Vic 3168.
Tel: (03) 542 4500.

PHILIPS Communication Systems is displaying a cross section of products from its PABX, data systems, networking, audio visual and mobile radio ranges. Headlining the display will be a preview of the new PABX, Sopho-S, scheduled to be commercially launched later this year. Sopho-S can

Full list of exhibitors, floor plan — Page 18

handle PABX capacities from 20 to 20,000 extensions, and can combine voice, data, text, and image switching with or without the use of the ISDN. Philips will also be showing their new P3800 multi-user micro system, closed circuit televisions, DLS110 PABX unit, and a new range of mobile radios will also be shown.

Stand Nos 9-12

Plessey Communication Systems Pty Ltd

122 Arthur St, North Sydney, 2060.
Tel: (02) 923 6341.

INFORMATION is transmitted with speed and clarity by Plessey's new Private Services Digital network.

The system, as displayed, incorporates 24 integrated digital exchanges with features and facilities transparent across the network.

Plessey also announces the release of its Integrated Services Digital Telephone capable of combining voice, data and image technologies. In addition, Plessey now manufactures and supplies the B-Mac satellite receiver, providing a link in the Homestead and Community Broadcasting Satellite Service (HACBSS).

Stand No 60

Rockwell Electronics (A'Asia) Pty Ltd

Cnr Sheep Rd and Maroondah Hwy,
Lilydale, Vic 3140.
Tel: (03) 726 0766.

SECURE voice systems designed to protect standard telephone lines and radio channels against interception are shown by Rockwell Electronics.

The TDS2004 (civil version) TDS-2004M (militarised) TX-900S and TS-500 series systems will provide an active display of the capabilities of this equipment.

A fibre optic ethernet-compatible local network will also be on show utilising Toshiba T-500 computers and 3 Comm. Cards from Imagineering for the purpose of system demonstration. Promoted will be Rockwell's new range of Automatic Call Distribution products known as the GVS-050 and GVS-3000 together with its fibre optics products.

Stand No 69

S.A.G.E.M.

2/122 Euston Rd, Alexandria, NSW 2015.
Tel: (02) 516 5399.

SAGEM has been supplying telex terminals to international markets for 40 years and is one of the world's largest manufacturers of VDU teleprinters.

On display at Atug 86 is the latest telex terminal, featuring a modular design for the ease of adaptation to suit the needs of business and to allow for future innovations. It is capable of being connected to either the telephone or packet switched data networks.

Stand Nos 67, 68

Scitec Communications Systems

3 Apollo Place, Lane Cove, NSW 2066.
Tel: (02) 428 9555.

SCITEC is announcing several new products.

- A 1200 bits/sec full duplex modem, the V22 compatible Business 2200 features auto dial/answer and security facilities.
- The MD X 5000 Data Exchange offers local switching and contention, as well as internode multiplexing.
- The BSPT1 Hi-speed TDM range has been explanded to offer compatibility with Telecom's new leased-line services.

Stand No 56

Shuttle Datacom Pty Ltd

Suite 37, 456 St Kilda Rd, Melbourne,
Vic 3004.
Tel: (03) 267 1291

MELBOURNE-based Shuttle Datacom is releasing three high performance products at Atug. The CTS9629FP modem, a V.29 9600 BPS full duplex four-wired leased-line modem, features fast poll mode with selectable RTS to CTS response time of 60, 30, 15 and 7.5 milliseconds and is ideal for use in a multi-point system.

Also new is the CTS14.4MX modem at 14,400 bits/sec for use in four-wire leased-line, point-to-point multi-port or multi-port polling applications with built-in six channel time division multiplexer.

Stand Nos 48-50

Siemens Ltd

544 Church St, Richmond, Vic 3121.
Tel: (03) 420 7202.

SIEMENS is presenting its range of PABX equipment as well as the text terminal T4200 model 50 office communications unit capable of being linked to the Teletex service and the PT 88S/89S inkjet printers developed for silent running.

On display is the recently-released UC closures for optical fibre transmission PABXs, the EMS 601 non-blocking PCM switch capable of handling voice, data and text transmission and suitable as an electronic office switching node, as well as the EMS 30 and EMS models with capacities from 1 to 1500 extentions.

Shuttle Datacom's Volksmodem is a 1200 bits/sec device and forms part of the display on Stand 56.

Stand Nos 36, 42

Telecom Australia

10th Floor, 35 Collins St, Melbourne,
3000.
Tel: (03) 657 3316.

Plessey ISDNs*
Connecting you to a dazzling future.
*Integrated Services Digital Networks

Telecost is displaying its enhanced range of Telephone Information and Management System devices on Stand 1A.

The Interquartz Feature Phone 9853A is a Telecom approved Hong Kong-built handset and can be seen on Stand 13.

A demonstration of Australia Post's E-Post electronic mail service can be seen on Burroughs' Stand 44.

Northern Telecom's SL-1 Digital Switching PABX which can be seen on AWA's display — Stand 43.

Stand No 1A

Telecost Pty Ltd

486 Whitehorse Rd, Surrey Hills, Vic 3127.
Tel: (03) 836 0322

LAUNCHED at the Telecost stand are two new products, the Voice Saver digitalised voice storage system and Account-A-Call single line call costing monitor.

Account-A-Call can be installed in conjunction with an extension or exchange line. Client rebilling account numbers can be added to the printout as can extension numbers. The Voice Saver is easily maintained and takes only 3.6 seconds to change messages.

Telecost's directory facility is also shown and features multi-linked search fields and online message facilities.

Stand No 12

Telectral Communications Pty Ltd

18-19 Horne St, Elsternwick, Vic 3185.
Tel: (03) 523 6544.

TELECTRAL Communications is exhibiting products which make it possible to do two things at once.

Highlighted is the Danavox Stetomike HMT 808, a light-weight headset from Denmark.

The Telecom-permitted set provides hand-free communication ideal for use at the switchboard, information desk, air traffic, radar and radio controls.

Stand Nos 1, 2

The Telephone Supply Co Pty Ltd

PO Box 231, Northbridge, NSW 2063.
Tel: (02) 406 5133.

THE Telephone Supply Co Pty Ltd, which has offices in Sydney and Melbourne has released the new Phillips SBX PABX. Designed for small business or as a satellite PABX on larger systems, SBX is available in two models: SBX6 and SBX12, with a maximum capability of five exchange lines and 12 extensions.

Some of the facilities available on both modes are: enquiry/transfer, auto ringback, call pickup, camp on, call forwarding, call park, last number redial, speed dialling, conference calls, intrusion and flexible toll restriction.

Stand No 46

Teletalk

GPO Box 604, Brisbane, 4001.
Tel: (07) 368 7223.

TELETALK, a division of the Fairfax Media Group, offers videoconferencing facilities. Its three co-ordinating centres are Sevencom in Brisbane, Artransa Business Communications in Sydney and Syme Communications in Melbourne.

The group has provided satellite, microwave and terrestrial-bearer interactions for customers such as Mitsubishi, The Society of Business Communicators, CitiBank, Christian Science and Herbal Life.

Stand No 65

Trippett Lane Consulting Engineers

Suite 7, 497 Burke Rd, Hawthorn East, Vic 3122.
Tel: (03) 20 6822.

TRIPPETT LANE is a joint venture between Trippett Allan and Associates and Lane Telecommunications. TL has carried out a number of assignments in the telecommunications field and has considerable experience in PABX network design and implementation.

On display is a PABX inventory and costing software package using Lotus 1-2-3 on an IBM PC or compatible machine. The system is menu based and offers facilities complimentary to those offered by a TIMS system.

Communication is the lifeblood of business success.

And Plessey Networks, through their leading digital telecommunications technology, will propel your business communications into a future era.

The Plessey iSDX, heart of the system.

The Plessey iSDX (Integrated Services Digital Exchange) is the digital telephone system from which the Network evolves.

The iSDX telephone system has been designed to combine voice, data and image technologies ensuring communication with facsimile, view data, telex, teletex, compressed video, and future services from private and public network sources.

Plessey technology even allows the iSDX to integrate, if necessary, with your existing analogue telecommunications equipment from a previous era.

Advanced Networking Capability.

PABXs are sometimes interconnected via analogue links with due loss of many system features. By the use of the latest digital technology the powerful Plessey iSDX provides total feature transparency across the complete Network.

The iSDX Networks incorporate two M.Bit/sec PCM circuits with digital common channel signalling between nodes of the Network.

Facilities are then impressed from end to end of the digital network at 64K.Bit/sec to all telephone points.

Private Networks can evolve from only a few hundred lines to 10,000 lines or more, uniting your local, regional, national and international activities.

Proven in use.

Not only is Plessey iSDX digital telecommunications technology the most advanced available, it is also proven in use.

Although only recently released in Australia, the iSDX currently holds over 70% of the top end of the UK market, and major installation work is already underway here.

A business edge.

When you invest in your own network based on the Plessey iSDX, you will not merely gain an edge in communications.

You will gain a business edge.

Connecting you to a future that isn't just bright, but dazzling.

For more information about iSDX Networks, contact:

Plessey Communication Systems Pty Ltd,
122 Arthur Street, North Sydney NSW 2060.
Telephone (02) 923 6333. Telex: 121339.
Cables Plesspac Sydney.

Faraday Park, Railway Road, Meadowbank
NSW 2114. Telephone (02) 807 0400.
Telex AA172384. Fax (02) 808 2787.
Cable TELIND.

Sales Offices: Melbourne (03) 320 4333.
Brisbane (07) 854 1300.
Adelaide (08) 42 6241. Perth (09) 368 2966.

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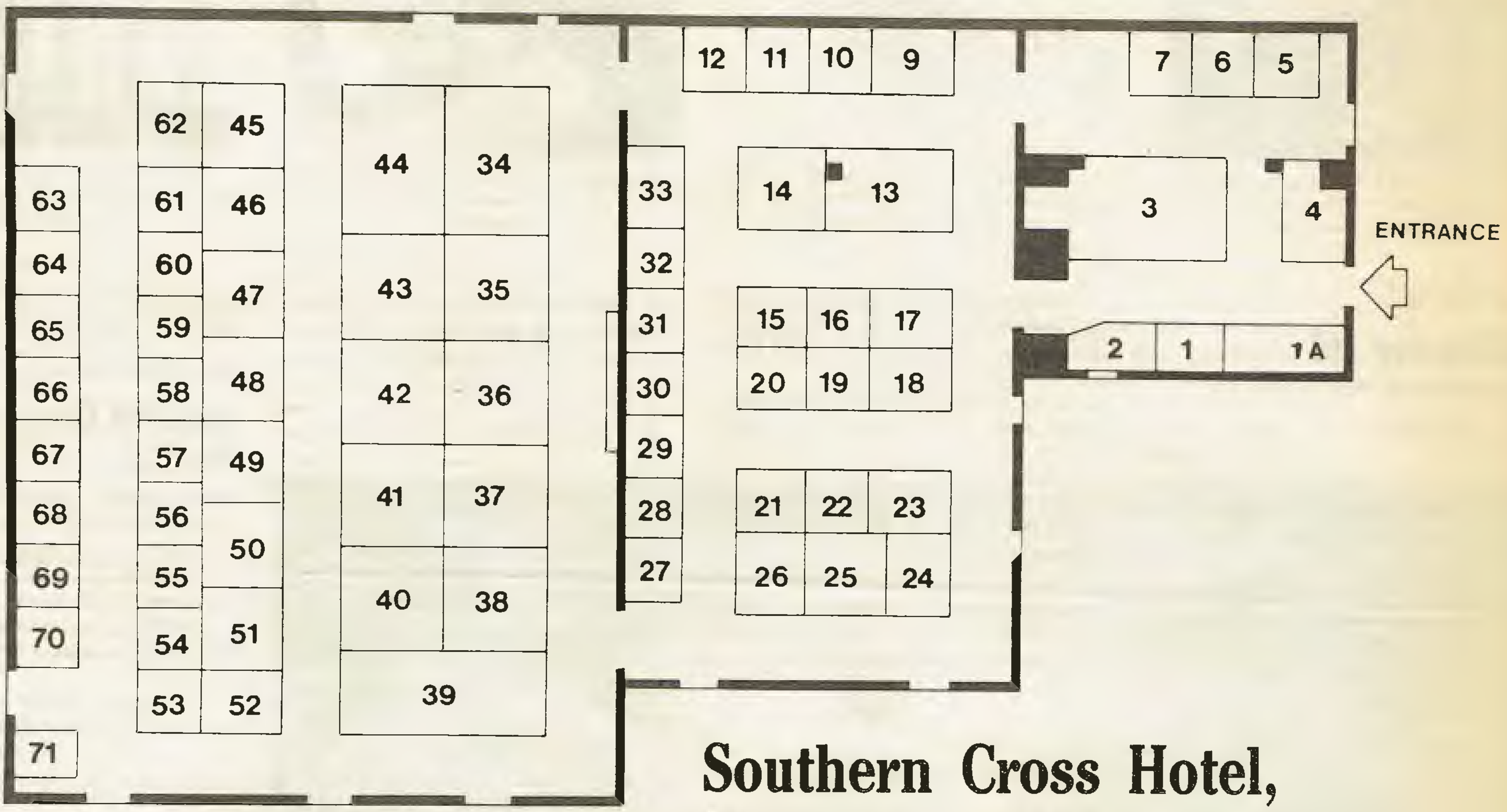
Third Australian Telecommunications Exhibition



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Stand Nos 51, 52

Tytel Pty Ltd

74 Whiting St, Artarmon, NSW 2064.
Tel: (02) 439 4499.

INCREASED memory and dialling capabilities are features of two new computerised telephones being launched by Tytel.

The new Tytel 721 has 12 memory locations adding to established product features such as tone or pulse dialling, handfree dialling, adjustable tone and volume levels and hookflash or earth return.

First show is also being given to the Tytel 762, a two-line executive telephone. It incorporates all the features of the 731 within an ergonomically redesigned keyboard.

Stand No 54

The TCG Group

PO Box 162, Chippendale, NSW 2008.
30 Balfour St, Chippendale, NSW 2008.
Tel: (02) 699 8300.

RECENT entrant to the communications field, the TCG Group, exhibiting its range of X-25 packet switching equipment manufactured by French data communications company, Sitintel.

Designed to be compatible with Auspac, the TCG product range includes asynchronous and synchronous pads and X-25 switches.

The TCG Group's major product offering in the Terpac SCN, offering direct connection of synchronous terminals to an X-25 trunk line.

Company Mailbox is being displayed by Textlite on Stand 61.

Stand No 61

Textlite Australia Pty Ltd

22 Princess Hwy, Arncliffe, NSW 2205.
Tel: (02) 597 1444.

THE Company Mailbox (C-Mail) communication system brings information to hand 24 hours-a-day. It sends and receives messages in print, passing on orders, reports and business offers with speed and accuracy.

The C-Mail communication network consists of the PX-1000, a pocket-sized terminal for transmitting or receiving text, and the Textlite PC mailbox centre which receives and passes on messages sent by the terminal.

Stand No 71

Voicecall Communications Pty Ltd

Level 3, 222 Kingsway, South Melbourne, 3205.
Tel: (03) 690 8055.

A PAGING system with a 20-message memory capacity is displayed by Voicecall Communications.

The Alphanumeric Pager from National, will accept up to 1200 characters or 20 messages.

Also on show is National's Multi-Alert Digital Paging Receiver, EK-2075.

The Voicecall alphanumeric pager is on display at Stand 71.

Optical fibre use highlighted

THE theme of Atug '86, Telecommunications Through the Looking Glass, highlights the increasing use of optical fibres in many applications. Besides the enormous capacity of these fibres, other benefits include minor signal loss, digital transmission, security, very small size and high reliability.

These benefits are so attractive for major traffic routes that national terrestrial carriers, such as Telecom, are pushing ahead with plans for rapid fibre laying. The urgency to take advantage of these benefits is illustrated by Telecom's plans to link mainland capital cities by this means by mid-1990s, no mean feat when compared with the time taken to effect such linkages in the past by copper, coaxial cable and microwave transmission.

Indeed, the emergence of this new technology has thrown the whole world of telecommunications into some confusion as optical fibres are now seen as a serious competitor to another booming technology, satellite transmission.

Further, optical fibres are not only suitable for long haul routes but also for local and wider area applications such as in manufacturing plants and in office buildings.

However, while some of the papers to be given at Atug '86 will be on this relatively new media, the overall aim of the conference is to enhance the knowledge of personnel associated with telecommunications and ensure they are aware of the technological, political and regulatory changes which could affect their planning for the next decade.

Recognising that telecommunications is rapidly becoming a tool which can enhance an organisation's market competitiveness, and therefore of interest to all levels of management, the organisers of Atug '86 have divided the conference into streams A, B and C.

Stream A topics are slated to be of interest to property managers, accountants and non-technical company personnel with some involvement in the day-to-day running of telecommunications systems, or those recently appointed to take on the responsibility for overall telecommunications management.

Stream B topics are designed for those who know the fundamentals of telecommunications and occupy such positions as communications or computer managers as well as communications consultants and other professionals.

However, a strong element in the conference is Stream C, catering for the interest and requirements of delegates in both Streams A and B.

The keynote address will be given by Dr Charles Baker, president, Telecommunications Engineering, of the US. Dr Baker, who has been involved with data processing and telecommunications since 1956, will talk about the opportunities provided by telecommunications for business.

Other presentations in Stream C, featuring speakers from overseas as well as from Australia, will deal with such subjects as deregulation/privatisation, how the national carriers see the communications environment, fibre optics and videoconferencing.

Delegates attending Stream A will hear about such topics as telecommunications management, what can be done with PABX's, text communications and small business communications.

Stream B will contain presentations on such topics as fibre optics (new horizons), the voice future, mobile/cellular radio and private networking.

Three workshops have been planned to allow delegates to participate more directly in the proceedings. These workshops are on: PABX, planning selection and cut-over; private networking, when and how to; and telecommunications management.

Those unable to attend Atug '86 can still participate by registering for the videoconference being relayed to Hilton hotels in Perth, Sydney and Adelaide and the Department of Industrial Development, Brisbane.

This conference will cover the last topics in Stream C, Telecommunications in Business, with prominent users speaking about their experiences.

The Conference Program

ATUG 86 will be opened at Hilton International Hotel, Melbourne, by Victorian Premier John Cain.

The keynote address will be given by Dr H Charles Baker, president of Telecommunications Engineering, US.

Stream A is targeted at premises property managers, accountants and non-technical company personnel involved in day-to-day telephonic decision-making or those recently appointed to manage their organisation's telecommunication facilities.

Stream B will be of interest to communication managers, EDP managers, communications professionals and other personnel involved in the determination of corporate/organisational communication strategies. Prior knowledge and understanding of the fundamentals of telecommunications is assumed.

Stream C is intended to interest delegates attending the other two streams.

STREAM A

The Telecommunications Manager A1

Speakers Allen Hyde, Chase AMP Ltd, and Tom Amos, Amos Aked Swift and Associates, will define the requirements for the position of telecommunications manager. The challenges and methods confronting a company setting up its communications system from scratch will be explored together with the requirements of, and need for, a communications consultant.

The PABX and the Value Added Office A2

Speakers Ernie Blamires, Consolidated Press Holdings and Charles Rizzo of Chase AMP will cover the usefulness and further utilisation of large PABX systems. Major topics discussed will include: modularity, distributed architecture, tandem networking, least cost routing, electronic mail, voice mail, call accounting, asynchronous terminal support, protocol conversion, redundancy, diagnostics, data gateways, 2M-bit working, PC interface CCITT No 7 signalling and fibre optics.

Developments in Text Communications A3

Speakers are Dr David Smythe, Australia Post, John Gerrand, Telecom Australia and Michael Klein, Vitel International, US.

The first two speakers will outline recently announced services provided by Australia Post's E-Mail service and Telecom's Teletex and Telememo.

The US speaker will offer alternatives for corporate message services, providing frameworks for evaluating user requirements, technological risks and solutions including internal systems, external services and hybrid approaches.

Small Business Communications A4

Speakers Richard Bridger Housley Computer Communications, and Warwick MacKenzie of ABIRA will outline the telecommunications options offered to small telecommunication users, including small PABX or the Commander system, FAX, 008 service and personal computers. Other options are two-way radio and paging systems.

STREAM B

Technical Innovation — The Voice Future

Speakers Brian Perkins, AAP, and Donald Vandoren of Vanguard Communications, US, will outline innovation in conversing with computers through voice synthesis.

Store and forward messaging systems already offer easy information exchange by telephone without simultaneous participation at both ends. A new Australian service providing opportunities for more productive communication will be discussed by our third speaker.

Fibre Optics — Technical Developments B2

Speakers Michael Quigley, Standard Telephones and Cables Pty Ltd, and Bob de Boer of Telecom Australia, will examine technical developments in this field. Telecom is extending its use of fibre optics in communications between Sydney and Melbourne.

Mobile and Cellular Radio B3

Speakers Peter Whalley, Victorian Department of Public Works, John Boland, Telecom Australia, and John Dearn, of Philips Communication Systems, will address the more technical aspects of mobile, cellular radio, paging and radio-telephone systems in a session designed to complement material in the A4 discussion.

Private Networks B4

Speakers are Stewart Lunn, Coopers and Lybrand W D Scott, Doug Rowell, Queensland Government, and Peter Brown of L M Ericsson.

The first speaker will discuss factors and decisions facing the communications manager as he tries to optimise his telecommunications requirements through methods such as the linking of outstations by using private networks which may not be linked to public switch networks.

An overview of developments of Q-Net and its use of Aussat will be given.

Also discussed will be the design and implementation of private networks using systems with totally distributed control.

STREAM C

World News — Life or Death After Deregulation Privatisation? C1

Speakers Tedson Meyers, communications law specialist with Reid and Priest US, and Howard Kleyn of Mercury Communications UK will give an insight into the benefits and pitfalls of liberalisation.

Technology News — Innovations and Perceptions C2

Speakers W G T Jones, chief executive technical of British Telecom, and Trevor Barr, senior lecturer in Media Studies, Swinburne Institute, will underline advances in telecommunications technology and the need for business and the private sector to keep abreast of these changes.

The Carriers Have Their Say C3

Speakers Chris Vonwiller, OTC, Philip Allen, Aussat, and Ian Campbell of Telecom will detail the perspectives, plans and aspirations of the "big three" carriers.

Fibre Optics — The Looking Glass of the Future C4

Speakers J. Patrick French, Cable and Wireless US and Ralph Nash, of Lend Lease Corp Ltd, will reflect on the conference theme, "Telecommunications Through the Looking Glass".

Telecommunications in Business Video Conference C5, C6

"A Conference Within a Conference." The first segment will comprise a one-way video, two-way audio conference between Hewlett-Packard in California, delegates at the Hilton and a wider audience in Australian capitals.

HP will outline the benefits of the US video conferencing network.

The second segment will be a forum between a panel of prominent business users, conference delegates and the wider audience. The panel will address the value and opportunities provided by business by telecommunications.

Workshops

Workshops in PABX-planning, selection and cut-over, Private Networking and Telecommunications Management will offer delegates hands-on experience. Each of the two-hour workshops will be chaired by experienced communications managers.

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7 Powell St, Waterloo, NSW 2017 PO Box 377, North Sydney, NSW 2060 Telex: AA25930

Carriers acknowledge benefits

By Frank O'Brien

THERE is no doubt that the of optical fibres as a transmission medium has been accepted as an economic alternative to digital microwave and satellites for high capacity long distance trunk communications. In recognition of this, Australia's national and international carriers are taking full advantage of the benefits of optical fibres.

Telecom is planning to link all major cities in Australia by mid-1990. In addition, OTC is participating in establishing a matrix of optical fibre submarine cables which will link the countries of the Pacific and Indian Oceans by the turn of the century.

But what benefits can be derived from optical fibre technology by the information system managers of the average Australian commercial or industrial companies? Are fibre-based systems being designed for their needs? Are cost effective solutions available? What action can DP managers take now to ensure their system will be compatible with optical fibre developments?

Before considering these matters it may be worthwhile to review some of the world trends, developments and applications of optical fibre technology, and then to apply the conclusions to Australia.

Optical fibre is the new mover and shaker of information technology. With optical fibre systems bit capacity/bandwidth cost is potentially so low that system designers will give it as little thought as computer designers now devote to the per-function cost of logic on a silicon chip.

Optical fibre systems are now commercially available that will transmit a total bit rate of 565M-bits/sec, the equivalent of 7680 telephone channels, over a pair of single mode fibres each with a core diameter of less than 0.01mm.

Optical fibres present many benefits to the communication designer:

- Huge system capacity/bandwidth.
- Digital transmission.
- Low signal loss.
- Immunity to electromagnetic interference.
- Security by being a non-radiating medium.
- Electrical isolation.
- Small size and weight, with flexibility and durability.
- Ease of expansion because of large inherent capacity.
- Reliability.
- Decreasing costs in real terms.

These advantages have caused a staggering growth in the use of optical fibres. A Japanese survey conducted by the OITDA found an average of 100 per cent annual growth in the utilisation of optical fibres in six major industrial countries between 1981 and 1983. Figure 1 shows the comparative projected market growth for optical fibres over the five years 1983-88 for Australia, Japan and the US.

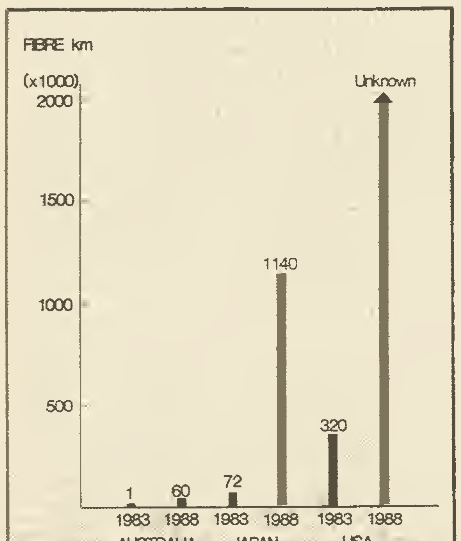

Figure 1: Comparative projected market growth for optical fibres.

• *Frank O'Brien, manager, CMPS Technology.*

This growth is introducing the economies of scale, and with increased competition, prices are falling steadily at about 20-25 per cent per annum. Figure 2 shows the relative movement in US prices for various data communication cables. Australian fibre cable prices are showing the same trend. On published figures, the 30 fibre cable for the Sydney-Melbourne route will cost 54¢ per cabled fibre metre. Telecom predicts that long-haul fibre costs will fall to about 20¢ per metre by 1988/89.

While discussing Telecom costs for the Sydney-Melbourne cable, it is instructive to establish some rough ball-park tariff calculations on this system simply to demonstrate the potential cost benefits of using an optical fibre system.

80,000 channels

The cable comprises 30 single mode fibres with each pair designed for 565M-bits/sec bothway operation to provide, with multiplexing equipment, 7680 bothway telephone channels. When fully equipped and allowing some fibres for protection switching this represents about 80,000 telephone channels.

Telecom estimates the total cost of initial systems due for completion by 1988 to be $A44 million. For the sake of this exercise assume this cost to be $100 million for a fully equipped system including multiplexing equipment. Assuming sufficient traffic demand existed to utilise each of the estimated 80,000 circuits at the rate of 10 per cent over a 24-hour period, this would represent about 4205 million circuit minutes per year.

The tariff required, at this utilisation, to recover the $100 million capital cost in one year is about 2.4¢ per circuit minute. To this must be added all those tariff components such as operation and maintenance, charge for use of other equipment in the network, cross-subsidisation and interest on capital.

Although the above is a first order calculation it is interesting to compare the possible rate with the current Telecom STD rates Sydney-Melbourne, being 48¢ per minute maximum and 27¢ minimum. The difference of course is one very good reason why telecommunication administrations and companies throughout the developed nations are investing heavily in optical fibre trunk networks.

In the deregulated market of the US entrepreneurs have entered the field installing longhaul optical fibre cables between cities wherever they can find an easement or right-of-way.

This optical fibre revolution in US longhaul trunk communications is now challenging the established positions of microwaves and satellites. It is also being repeated in the more regulated environments of Japan and Europe.

Leaving trunk communications, it is interesting to examine developments with local area networks (Lans). In the US there are more than 25 commercially available optical fibre Lans. These Lans encompass both star and ring topologies with data rates from anywhere between 500K-bits/sec to 200M-bits/sec. Because of the success of Ethernet, the most popular fibre Lans today are Ethernet compatible. Almost all such systems employ a star topology, as typified by products now manufactured by the Australian company Integral Fibre Systems Pty Ltd.

The US trend is towards high-speed optical fibre Lans operating in the range 50M-bits/sec to 200M-bits/sec. The main application for the higher-speed networks is to function as a backbone for multiple lower-speed subnets. In addition, highspeed digital Lans will be able to support other communication services such as digital video. At present, multiservice Lans that include video can only be supported by broadband technology.

Japanese companies, especially NEC, are also active in developing high speed optical fibre Lans for backbone operation.

There are two developing Lan standard activities which foreshadow the future of optical fibre Lans. The first is the IEEE 802.6 MAN (Metropolitan Area Network) draft standard which specifies a 50M-bits/sec slotted ring. Dual counter-rotating optical fibre rings with active nodes, electrical bypass and loopback are specified.

The second is the Ansi X3T9.5 Fibre Distributed Data Interface (FDDI) draft standard which specifies a 100M-bits/sec token ring. Again, counter-rotating rings with electrical bypass and reconfiguration are proposed. The FDDI network will support 1000 nodes over a 200km fibre path with a maximum spacing between nodes of 2km.

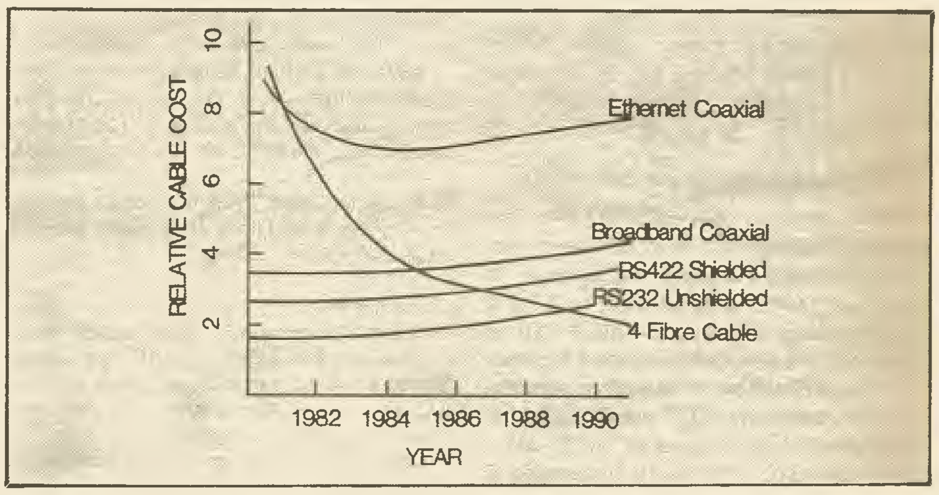

Figure 2: Comparative cost of data cables.

In Australia a number of optical fibre Lans have been installed and others are planned. Some of those installed are:

- Melbourne Metropolitan Board of Works.
- The University of Sydney's Sydnet.
- Capricornia Institute of Advanced Education.
- Lend Lease's Australia Square Ethernet.
- Digital Ethernet extension at Chatswood.
- Carlton United Breweries Facom System.

Major computer companies are also now offering optical fibre systems to extend the distance between mainframes and large peripherals.

The application of optical fibres as high speed data buses in computer installations and as Lans, has helped to ease the migration of optical fibres from trunk applications to commercial applications.

Another application where the special benefits of optical fibres are being widely accepted is in instrumentation and process control in mining, manufacturing and chemical plants. To give an example of the interest in this field, at the 1985 Instrument Society of America International Conference and Exhibition in Philadelphia, a main theme was electro-optics. Many of the 800 exhibitors demonstrated their latest products in optical sensors and communication links for process control to the 26,000 who attended.

In Australia an increasing number of applications are being found for optical fibres as communication media or sensors in extreme or hazardous environments. Fibres are offering benefits not available with normal copper cable solutions. Installed systems include:

- Alcoa — Bauxite mining conveyor control.
- Argyle Diamond Mines — security system.
- Comalco — Kaolin plant control.
- Broken Hill Associated Smelters — CCTV.
- Maritime Services Board NSW — Coal loader control.
- Ford Australia — Manufacturing plant sensors.
- Australian Tube Mills — temperature monitoring.
- Shell Company — loading bay control.
- Amoco — terminal and refinery control.

Railways and electricity transmission authorities in Australia are also using optical fibres for specialised communications purposes.

From this review it can be seen that optical fibres are now being extensively utilised in particular applications where their special advantages and economic cost justify their use. Utilisation will grow as the technical community becomes aware of the benefits.

Information system managers should recognise the immense push towards digital communications and the potential for lower costs once the optical fibre transmission network is developed. It is now clear that the future scenario of one or a number of 2M-bits/sec wideband services to each large corporate user, entering through a gateway to a Lan or 4th generation PABX, to be used for voice data or video as required, should be considered as part of communication strategy planning.

Whenever practical, managers should introduce some optical fibre transmission equipment into their systems in order to become experienced in its application and to stay conversant with technological developments. In specifying requirements for facilities in new buildings or retrofits of existing buildings, managers should recognise the developments in information technology and the role optical fibres will play.

Separate information system risers with adjacent satellite equipment rooms located on each floor should be specified to provide flexibility for a range of system options. Cabling to room outlets from the satellite rooms will vary with selected systems but if there is any difficulty with future access then a 2 or 4-fibre cable should be installed and left unterminated in the wall cavity.

Optical fibres have yet to invade the office or industrial buildings environment to any large degree, but the potential to do so is immense and cost justification for special applications exists now.

Switched-on innovator

One argument for new high-technology services such as Aussat's satellite systems is that they present opportunities for Australian manufacturers to design and build the necessary ancillary equipment. When Telecom introduced its Digital Data Service, a high-speed leased line data service for large corporations, JN Almgren Pty Ltd, Sydney, developed, in collaboration with the ANZ Bank, a multiplexing/switch device now with export potential. Noel Bennett visited Almgren's expanding Chatswood factory to switch on to this new development. Gathered around the table, selected because it was close to natural light, (the main light and power circuits blowing continuously with airconditioning problems), were Ian Barnes, project manager for the AS 100 development and Roger Parrack, national sales manager.

INITIAL design of the AS100 began some two years ago and the completed product was subsequently released at the Pan Pacific Computer Conference in September 1985, a comparatively short time for such an innovative product.

Work began after a request from the ANZ Bank which was becoming heavily committed to DDS lines. It required a multihost fall-back switching and multiplexing system to enable data to be redirected through a digital circuit switch to a CPU, avoiding downtime.

The paramount importance of such a facility to the bank's operations is underlined by the bank's installation of 6500 cashier terminals. Traffic from these terminals is directed via Telecom's DDS through the AS100 switch to Almgren's AS65 multiplexers and then to the appropriate frontend processor and ultimately through to the host computers. When work began on the AS100 project, new digital technology was becoming available to meet the speed requirements of DDS. Normal matrix switching could not meet these requirements, according to Almgren. The systems of large DDS users tend to comprise 30, 60 or 90 streams of 48K-bits/sec traffic, but the conventional matrix switch can typically only handle 5-10 such streams. On the other hand, the AS100 handles up to 200 48K-bits/sec streams per switch/multiplexer module.

The Almgren team did not begin from scratch with the AS100 design, having designed the AS65 multiplexer for X.22 traffic. This product has also been bought by the ANZ Bank which has established a firm relationship with Almgren for its present and future data processing needs.

While the concept of the switch was new to Almgren, admission is made that the company probably "re-invented the wheel" in some respects as the AS100 could be considered to be essentially a time division multiplexer. After examining various chip alternatives, Almgren chose the TMS 32010 processor chip from Texas Instruments running at 5 Mips (millions of instructions per second) and able to handle four ports from each board. The 100 nanosecond Ram chosen is out of the Hitachi stable.

The Almgren team, comprising up to six people, spent a few months in brainstorming the idea, "talking it out", and then after three to four months came up with the design philosophy of using time division multiplexing techniques based on a bus system.

Work then proceeded on circuit design, with original work refined, taking advantage of the comparatively new chips, to make the final design more elegant.

However, the design team was not operating in vacuum. Besides the requirements of the ANZ Bank, the marketing committee wanted to expand the number of features, made possible by the high-speed chips. With the design philosophy bedded down, the next task was software development with problems exacerbated by lack of any prototypes to test software developed.

Lowest level

For software implementation on the TI chip, Almgren brought a development system from TI in the US enabling the team members to familiarise themselves with the chip's characteristics.

This implementation was at the lowest level in the hierarchy of software development, the next highest being the controller which continually interrogates the board and if power is momentarily lost, provides the switch with the ability to go back to its original position.

Software for this system was designed on Almgren's Wicat minicomputer system.

The highest level in the software hierarchy was the switch controller, the hardware that the customer actually sees. This is driven by an IBM PC/XT and was written by outside consultants, BS Microcomp.

The AS100 is the first of a number of products to be developed as new options are made available by Telecom such as the 2M-bit/sec Ausplex DDS product and the integrated Services Digital Network.

Essentially, the AS100 can take in 48K-bit/sec streams and then break it down to 2400 bits/sec segments or can take one high-speed stream on one channel and switch it to another channel.

According to Almgren, Telecom is examining the product as it perceives a need among organisations which are integrating diverse digital services such as digitised voice, data, facsimile and video in 2M-bits/sec streams.

In this way, Telecom apparently considers the AS100 to be a multiplexer, but Almgren sees the intelligent switching capability of routing traffic to multiple locations, without the involvement of Telecom, as being of utmost importance to customers.

The combination of these switching services would be of comfort to the small to medium organisation.

However, for any organisation, time is money and a break down in the switching system could mean interruption to services. The AS100 guards against this, being able to divert traffic to another port and so to the host computer.

Telecom can effect this diversion, but some users prefer to have this facility inhouse.

For a large organisation, keeping track of the condition of all lines coming into the central hosts is a nightmare. Here, the AS100 provides a central access point where operators, through the IBM PC XT, can pick up a dead line before the user at the other end of the line knows about it.

Dual bus systems in the AS100 together with multiple power supplies and multiple clock circuitry ensures that the AS100 is fail safe, Almgren said.

Self-configuring

This attribute is amplified by port redundancy so that the worst that can happen is for four ports to be lost out of a maximum 1732* and the whole system is designed to that boards can be taken out and replaced in a living system — the AS100 is self-configuring.

Switching functions can be performed by single AS100's in networks making use of central control of multiple units where decentralised control is required.

The AS100 is said to be ideal not only for DDS, but also for Telecom's Datel service and is capable of supporting all electrical interface, speed and options available from Telecom including X.21, X.22 (all configurations), V.24 and V.35 with support of G703 (2.048M-bits/sec) planned. Further the AS100 is transparent to all protocols.

Derek Gall, general manager, electronic network services, ANZ Bank, has said Australia "was already ahead in the Telecom DDS area and the AS100 is a product at the forefront in its application to that area".

Backing up these words, the National Mutual Royal Bank is to instal an AS100, and strong interest has been shown by other banks, finance companies and government departments which are heavy users of DDS. Almgren has also received expressions of strong interest from organisations in the US to distribute the product there with export opportunities, in Europe as well, to be explored in March/April this year.

Almgren's sentiment is: "There is a lot of potential for the product."

Ian Barnes, project leader on the JN Almgren team which developed the AS 100, works in the research and development system.

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* *Max 1732 if configured for lower speed DDS streams. Max 190 if configured for 48K-bits/sec streams.*

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At the leading edge of ISDN

A service such as Integrated Services Digital Network (ISDN) is not simply implemented by inserting a plug into a wall socket and "switching" on. This article, by Ron Spithill, marketing director of Standard Telephones and Cables Pty Ltd, describes the company's contribution to the experimental work being undertaken by Telecom's renowned Research Laboratories, Melbourne, towards the implementation of ISDN on a national basis.

EIGHT tonnes of sophisticated electronic equipment were dumped on Telecom Research Laboratories in Melbourne last July 15 and 18 days later these began a new chapter in Australia's history.

That day, August 2, the nation's first Integrated Services Digital Network call was successfully switched on the ITT 1240 ISDN experimental exchange at the laboratories.

It was the culmination of years of involvement in the 1240 project and ISDN by Standard Telephone and Cables Pty Ltd (STC), which has invested $A3 million in this technology.

Two ITT 1240 ISDN experimental exchanges have now been installed at the Telecom laboratories. The purpose of the experimental exchanges is to provide Telecom Australia with early experience in the range of techniques for ISDN switching and also in the types of services that can be supported on an ISDN. STC engineers are providing both hardware and software support for the exchanges and are also participating in the Telecom experimenal program.

Telecom will carry out investigations into ways of setting up telephone calls through an ISDN, and the manner in which they are handled through the exchange and transmitted over the network. It will look at the feasibility of carrying voice, data and pictures on one line simultaneously at very high speeds together with the intricacies involved in linking an ISDN to networks like Austpac.

STC is now participating in the experimental program with Telecom and, within this context, is providing local hardware and software support for the 1240 ISDN equipment.

There is considerable activity around the world both in the setting of international standards and in the development of ISDN product equipment. ITT is well advanced in this area and the ISDN experimental exchanges are a stepping stone in the development of an ITT 1240 ISDN product. Product development is currently proceeding at ITT laboratories in Italy, West Germany and Belgium with pilot services planned in Germany late this year.

ISDN will support not only voice services (normal telephones) but will also cater for a wide range of data services including videotex, teletex, electronic mail, facsimile, personal computer communications, packet switching services and many more.

Digital technology will be supplied to the customers premises providing first, business customers, and then individuals with access to the above services.

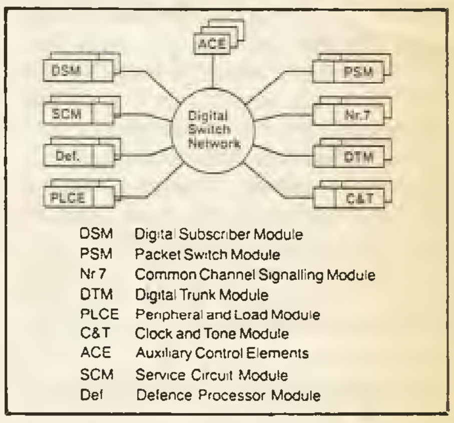
In an ISDN all of these services can be supported on the one network, whereas the traditional approach has been to set up separate networks for each service.

In 1983 Telecom Australia sought responses from several companies on the supply of ISDN equipment and their support for an experimental program. ITT in Belgium and Italy were at that time involved in the development of experimental ISDN equipment for field trials in these countries and similar equipment was offered to Telecom.

The ISDN experimental exchanges each comprise seven racks. Of these, four racks are standard 1240 racks and the remaining three have been specially designed to support ISDN functions. The four standard racks contain digital trunk modules, *7 common channel signalling modules, magnetic tape units, Winchester disk drives, clock and tone modules, man machine interfaces and parts of the switching network.

The special ISDN racks contain digital subscriber modules, packet switching modules and line termination equipment. Each digital subscriber module controls two subscribers and each subscriber has the 144K-bit/sec access mentioned before. There are two digital subscriber modules in each exchange, supporting a total of four subscribers.

This number is quite sufficient to demonstrate a wide range of ISDN services. The packet switching modules perform packet switching functions for both 'B' and 'D' channels. The line termination equipment provides the interface between the digital subscriber module and the single pair telephone line. It works in the echo cancelling mode and can work over distances of between four and six kilometres.


ACE
DSM
SCM
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PLCE
Digital Switch Network
PSM
Nr.7
DTM
C&T
DSM Digital Subscriber Module
PSM Packet Switch Module
Nr 7 Common Channel Signalling Module
DTM Digital Trunk Module
PLCE Peripheral and Load Module
C&T Clock and Tone Module
ACE Auxiliary Control Elements
SCM Service Circuit Module
Def Defence Processor Module

Figure 1: ITT 1240 ISDN experimental exchange.

At present the line termination unit is made up of 11 printed circuit boards, however VLSI chip developments will bring this unit down to four chips later this year and ultimately to a single chip. One line termination unit is required at each end of the subscribers' line.

To demonstrate ISDN services, a range of terminals has been supplied. These include digital telephones, teletex terminals and facsimile terminals. Of these, the telephone is the only new terminal as it provides more capabilities than current telephones, in particular an alphanumeric display. The other two terminals are normal commercially available data terminals.

Each subscriber is provided with an s-bus and up to eight telephones or data terminals can be connected to this bus. To allow terminals to be connected to the s-bus a terminal adapter is provided for each terminal. These provide basic signalling functions and also the hardware interface to the s-bus.

As part of the Telecom experimental program other terminals including photo-video terminals (picture quality videotex terminals) and very high speed facsimile terminals will be used.

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Concise, accurate message transmission

Verbal messages are easily misinterpreted, even under ideal conditions. And the busy, noisy environment of a car, van or other mobile unit is usually far from ideal. The VDU terminal used in the MDI system, on the other hand, guarantees a totally accurate reception, and a recall function allows message checking without time-wasting calls to base.

Unbeatable security

Unlike 2-way voice transmission — or car telephones — data bursts transmitted to your mobile VDU's provide an extremely high security mobile data system.

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PLESSEY
Connecting the future

Iterra service tunes in

Telecom has more than just a financial interest in Aussat Pty Ltd. It is using the satellite systems itself to provide an integrated satellite/terrestrial service to its customers. Telecom here explains the variety of Iterra services available and their particular applications.

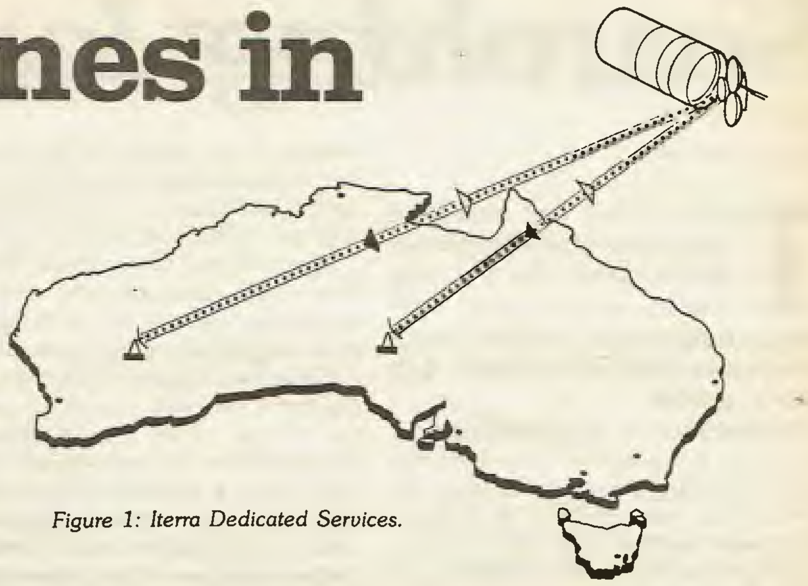


Figure 1: Iterra Dedicated Services.

In the second half of 1986 Telecom Major Earth Stations (TMES) will be providing Iterra Business Services in Brisbane, Sydney, Melbourne, Adelaide and Perth. If warranted by customer demand, additional TMES will be installed in other cities.

The TMES are configured around the 2M-bits/sec level of the Conference of European Post & Telecommunication Authorities (CEPTA) hierarchy for digital transmission.

Thus, the services accessible via TMES include:

☐ Digital voice at 64 or 32K-bits/sec using PCM or ADPCM codes.

☐ Data at a variety of rates including 4800 and 9600 bits/sec, 48K-bits/sec, 2048K-bits/sec.

☐ Compressed video and high speed facsimile.

The TMES will have 11-metre antennas, and will be co-located with Telecom facilities such as trunk exchanges and radio terminals, thus minimising the cost of tails between the TMES and customer premises.

The Iterra Business Services offered through the TMES allow customers to take advantage of the satellite's characteristics (distance-independence, broadcast capability, multi-access features) while reducing costs by sharing the use of the expensive earth stations with other customers.

Telecom also has on order a number of earth stations for Iterra Dedicated Services (Figure 1). As the name implies, such earth stations will be dedicated to particular customers, and in fact in most cases will be located on customer premises.

The earth stations are of two types, one based on 64K-bits/sec "building blocks" and the other on 2M-bits/sec. As with the TMES, the digital building block approach allows a variety of speeds and services to be provided.

The sorts of customers interested in Iterra Dedicated Services fall into one (or both) of two categories. First there are those for whom the satellite's chief attraction is simply that it is not terrestrial. The maximum network reliability is seen as being provided by redundant and completely separate technologies.

The second category of customers include those who need satellite service in areas where a TMES is not available, for example in a regional town or remote mining site.

The Iterra Dedicated Services have another distinguishing feature from the customer's viewpoint. With the Network and Business Services, the customer chooses from a range of standard service offerings. The Dedicated Services, in contrast, are essentially custom-designed.

There are several applications in Australia for what is essentially a data broadcast service at 2M-bits/sec.

In all cases they originate in major cities (Brisbane, Sydney, or Melbourne for example) and are to be transmitted to other capital cities and large regional centres. With the development of the terrestrial network, 2M-bits/sec links between all major cities are becoming more numerous and more economical.

For networks with only one or two receiving sites, then, digital microwave radio and optic fibre terrestrial links will be the preferred technology.

With more than three or four receiving sites, however, the satellite's broadcast advantage becomes significant and an Iterra Business Service (for capital cities) or Iterra Dedicated Service (for country towns) begins to look attractive.

It is possible to use the TMES as part of the security provisions in a private network, and in fact a few of Telecom's customers are planning to do so. However, the maximum use of the satellite as a network backup is made with Iterra Dedicated Service onsite earth stations.

Consider the customer network shown in Figure 2. The customer wants to protect the links in this star configuration data network. Note that the customer has other communications needs as well — voice tie lines, some videoconferencing — but the protection is only considered vital for the data.

The "brute-force" protection technique would be to duplicate the data network, once with terrestrial facilities, and again with satellite. However, this would neither be very economic nor take advantage of satellite characteristics, in particular the flexibility and multi-access features. The recommended technique, shown in Figure 3 results from the following: First, the customer makes a judgement as to the minimum data requirements for each leg of the star.

In consultation with Telecom, the customer next estimates the minimum total data capacity required of the backup network. If the customer agrees that it is very unlikely that more than one leg of the terrestrial star network will be faulty at any given time, the minimum requirement for the total will be the same as that of the largest leg of the star.

A backup Iterra Dedicated Service is provided, with that satellite capacity. Taking advantage of the satellite's flexibility, the satellite capacity is normally used for voice tie lines.

If required to replace a faulty terrestrial link, the satellite capacity is switched to that link, and the voice traffic is diverted to the switched public network.

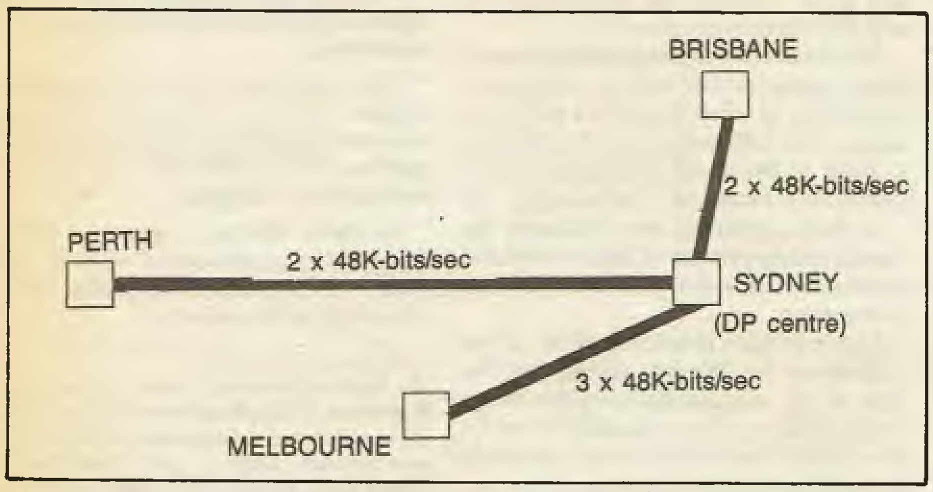


Figure 2: A typical data network that a customer might want to protect.

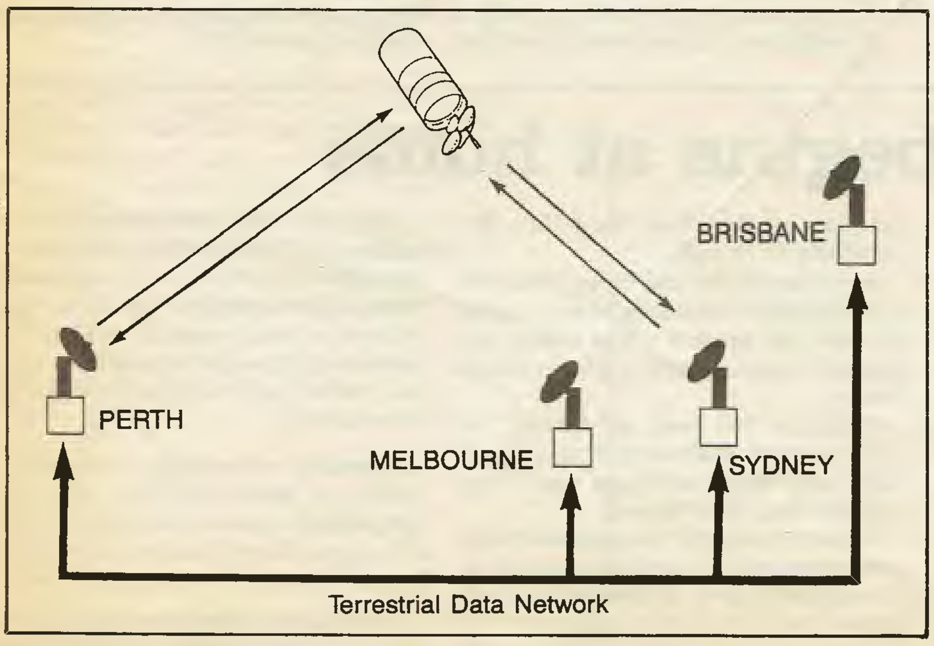
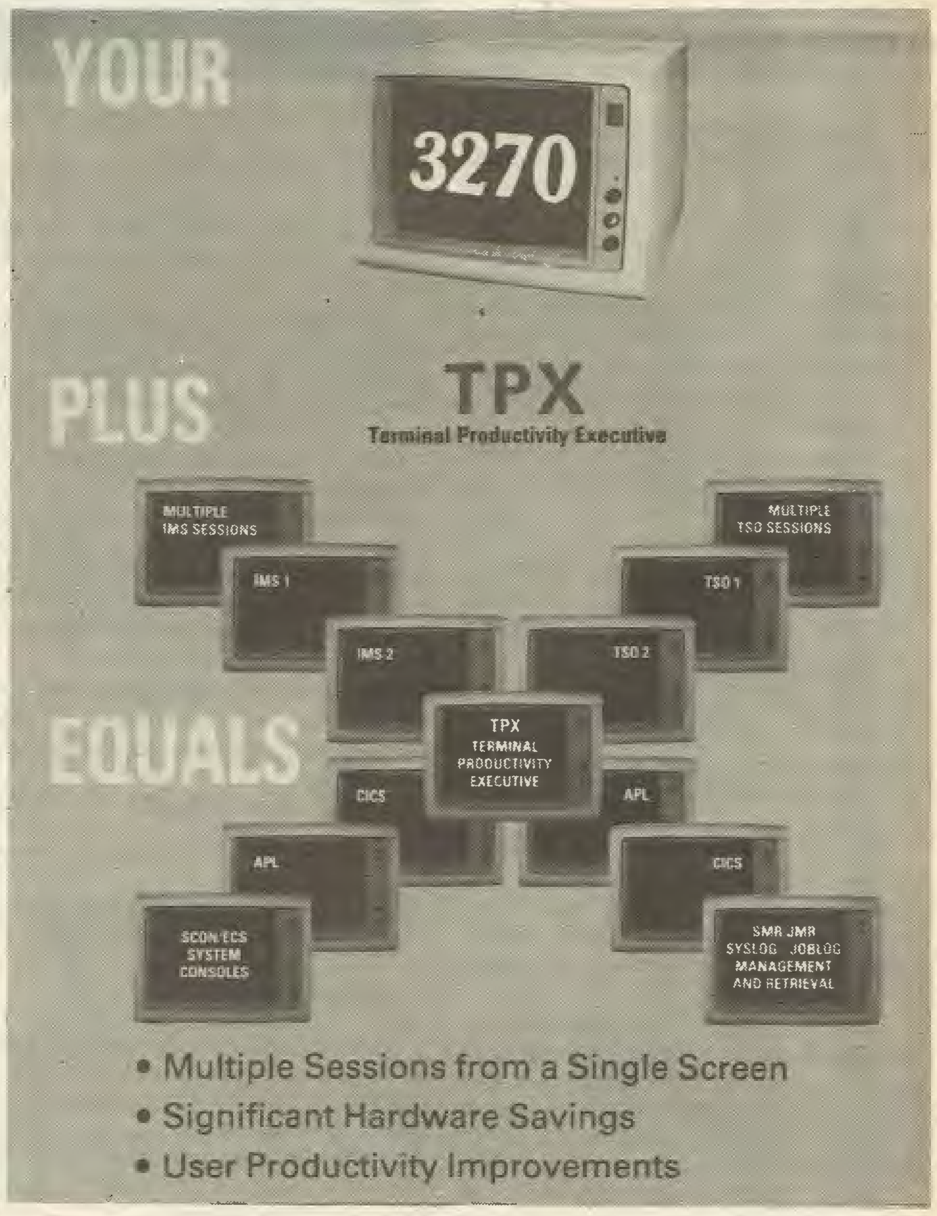


Figure 3: Network reliability enhancement.



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BOOK REVIEW

Searching look at Aussat

By Noel Bennett

THE number and variety of telecommunications highways that a nation has not only reflects its economic well-being, but also affects its culture, population movement, and relations with other countries.

Developments in telecommunications technology, however, can cause disruption both by creating power plays between the old and the new providers of telecommunication services and also between those vying to ensure the alternatives go to their particular favor.

And as with any new technological advance, such alternatives raise important national policy issues.

The Australian Film and Television School devoted a recent issue of its regular publication, Media Information Australia, to Aussat and examined these and other topics.

The 134 pages of **Aussat and After** contain almost 40 contributions in four main sections; The Policy Process, The Outback, Using Aussat and The Future. Most of the papers concern television and similar services and therefore would be of minor interest to DP/MIS and telecommunications managers.

New ball game

However, as telecommunications now has strong political overtones — with each of the carriers, Telecom, OTC and Aussat zealously guarding what they perceive to be their own entrenched interests — the early chapters on the power plays behind the formation of Aussat and opposition to it help to illuminate present political positions which could affect the provision of conventional data, voice and other services.

Also, those papers on data transmission will provide telecommunication managers and others with valuable information on options now emerging.

A former Minister for Posts and Telecommunications, Anthony Staley, notes that Kerry Packer had stimulated public debate resulting in the consequent Federal government-commissioned White report recommending in favor of a domestic satellite system.

However, Staley notes major resistance came from the Regional Television Broadcasters and Telecom, the broadcasters fearing a satellite would impinge on their interests and the then managing director of Telecom, Jack Curtis, maintaining terrestrial networks for most applications was a cheaper alternative.

One of the considerations that drove the government towards a satellite was the possibility of obtaining satellite television reception in the outback by relatively small and low-cost earth stations.

Total private ownership was never seriously considered as government departments and instrumentalities were likely to be the major users. Also, he says: "I saw no point in frightening those already alarmed by this mysterious new technology."

.Giving control to Telecom also did not appeal. Staley says a satellite is only part of the equation for better and more diverse broadcasting and communications services for Australia a point made by R C Johnson, deputy general manager of Aussat.

In his paper, Aussat: A Catalyst for Change, Johnson says an organisation, by dividing telecommunications traffic between Telecom and Aussat, may obtain both total technical and organisational diversity, of increasing importance as more and more reliance is placed on high-quality telecommunications.

Ending on an optimistic note, Johnson says it is evident that Aussat and Telecom, making use of satellite and terrestrial communication facilities respectively, have the tools to continue to "make the Australian national network second to none".

However, the chairman of SATUsers, John Chick, illustrates how a new technology can be perceived by the operators of an established service as a threat.

Chick says Telecom critics have pointed out that it has been slow to acknowledge the complementary roles of satellite and terrestrial links. For many years, Telecom had fought the satellite proposals, using arguments that owed something to economic theory, but far more to institutional conservatism and union intransigence.

SATUsers was formed to put forward the case for minor, non-profit users when the domestic satellite was being considered.

Chick says the partial loss by Telecom of its monopoly status has already forced it to modify a number of its basic assumptions and "more radical changes are sure to follow".

> ‘*Aussat does not look likely to bridge the gap between rich and poor; between the information rich and the information poor.* ’

The Queensland Government is one of the most innovative users of Aussat, establishing a network, Q-Net, for the management of government functions within the State.

In his paper, the deputy director and chief executive officer of the Queensland Department of Industrial Development, Douglas Rowell, says present approaches to Aussat involve changing policies and practices so they do not disturb the status quo.

"Such limited approaches will not suffice if we are to achieve maximum social and economic benefit from the large and rapidly changing range of telecommunications technologies and consequent products available to us today," he says.

Better business resulting from appropriate telecommunications can produce more competitive and productive industry and commerce.

Ian Reinecke, journalist and author specialising in telecommunications, criticises the way in which the decision was first made to go ahead with the domestic satellite and the Labor government's continuing with the coalition government's decision.

Reinecke posits that if Australia had said no to its own satellite system, it could have provided remote television more cheaply by using Intelsat — the international satellite communications carrier.

On telecommunications, Reinecke says: "Life without the satellite would be similarly less complicated and government funds (could be) diverted to further extension of Telecom's networks and to the development of local technology."

Jim Falk, director of the information technology and communication research program of the Centre for Technology and Social Change at the University of Wollongong, is also critical of the potential social role of Aussat.

He argues that Aussat "does not look likely to bridge the gap between the rich and poor, between the information rich and the information poor".

He points to the seeming pitfalls of bandwagon argument that serve to exclude considerations of what needs the system is supposed to fulfil and when is the best time to build or buy a selected type of technology in a period of rapid change.

In the contribution from Telecom, the complementary nature of the terrestrial and satellite services is stressed rather than their competition.

This is perhaps best summed up by the spokesman for Telecom saying that the bulk of the national telecommunication traffic will always be terrestrially-based for the simple reason that the user spectrum is not broad enough to provide more than a fraction of Australia's ever-increasing telecommunications requirements by satellite.

Nevertheless, the spokesman says that the satellite's flexibility makes it a very important and useful complement to terrestrial facilities and will result in better telecommunications facilities for all Australians.

Alan Aked, a director of Amos Aked and Associates, looks at costs in his paper on Aussat and Business Management. "The indications for business management," he says, "are that very cheap telecommunications services will not emerge from the domestic satellite system" and "if satellite transmission is to be used for business communications, large systems and large expenditures will be required."

Aked says that for small to medium-sized business the Aussat price listings will be attractive, particularly if alternatives to Telecom for capital city communications at comparable or discount prices are required.

Of particular interest to the financial services market is the article by Andrew King, manager, communications planning and design, ANZ Banking Group Ltd.

Big voice network

ANZ has developed the largest private company voice network in Australia and Aussat is attractive for this purpose.

"There is an increasing uneasiness with the growing dependence on Telecom as it becomes an integral part of the electronic banking service," he says.

"Aussat allows banks to be independent of Telecom for critical applications and for this purpose has an attraction regardless of cost."

Other contributions raise issues of Aussat and the South Pacific, technology, transfer, the future of satellite communications, technology and legal "conundrums" surrounding the whole area of Aussat, Telecom and OTC.

The historical, political and other non-technical articles provide a necessary round-up of considerations that could come to the fore as Australia makes decisions on future satellite developments and applications.

Such decisions will in one way or another affect the carriage of data, text, voice and graphics and therefore affect the position of the DP/MIS and telecommunications managers.

For these reasons, Aussat and After is thoroughly recommended reading even though these managers probably have a long reading list already.

● *Media Information Australia, Number 38, November 1985, Aussat and After, published by research and information, Australian Film and Television School, 13-15 Lyon Park Rd, North Ryde, NSW 2113. Single copies: $A9 for institutions, $A7 for individuals and $A5 for students. Special supplement, annotated bibliography on Aussat, $A5.*

Exporting begins at home

(Continued from page 7)

To cater further for the need for faster and faster transmission, Netcomm is now distributing the Trailblazer from the US which can transmit and receive data over the public switched network at up to 15K-bits/sec offering an alternative to leased lines over long distances.

Howells says that technically Netcomm would have had trouble itself in developing such a product, "an extraordinarily smart box" incorporating the Motorola 32-bit 68000 chip and a Texas Intruments TMS 320 very high speed signal processor.

This product will fill a niche in the market place where others "would not fly", according to Howells.

However, for the time being, Netcomm is not thinking of importing other products. If it does, the product will be chosen and handled "properly" so that it is a profitable venture.

Netcomm has been self-funded, the company having kept away from banks as they want "you to mortgage your house and the dog," said Howells.

On the other hand, management investment companies do not understand the requirements of small companies for growth capital and could not understand that directors would not want to hand over 30 to 50 per cent of the company's shares.

But while one disadvantage of self-funding might be that the company will now grow as fast it could with outside money, the advantage is that the company is forced to watch carefully its day-to-day operations. "If we had a bundle of money, we could lose sight of this and just sit back," Howells says.

Netcomm is examining possibilities for exports in South-East Asia and to the "wonderful" opportunities in Europe, but at the same time is "keeping its feet on the ground".

No doubt to ensure it will be always going up the roller coaster of success rather than down.

Down-to-earth advantages

AUSSAT is good for what? At a time when communications options and services are exploding, Peter Webb, marketing the national satellite carrier, explains what advantages, including price, can be enjoyed by telecommunications users taking advantage of Aussat's facilities.

WITH the successful launches of the first two Aussat satellites, and the scheduled launch of a third satellite later in the year, Australia has joined the ranks of countries operating domestic satellite systems.

Telecommunications managers must ask themselves what applications could be better handled by satellite, and how this new technology can be best incorporated into their present communications networks.

Aussat was created by the government to offer complementary services to Telecom Australia. Aussat has interpreted this to be not only complementary technology (satellite vs terrestrial), but also complementary philosophies on how to provide access to their system.

Thus Aussat encourages customers to use their own earth stations as well as Aussat earth stations; there are few mandatory standards on the performance of the circuits or the networking interfaces and protocols to be used in system design.

The simplest way to use satellite circuits is through Aussat-owned earth stations. Aussat has put large (and hence very efficient), earth stations in every capital city — eight in total, including Darwin and Canberra. These are known as MCESs (Major City Earth Stations).

The published prices for full-time leased circuits through these earth stations are shown in Figure 1.

Simple options

The prices include use of the Aussat earth stations ("ground segment") and satellite capacity ("space segment") but do not include the connecting circuits from a customer's premises to the Aussat earth station ("tails").

One of the simplest options for these connecting circuits, but by no means the only option, is to use short distance leased lines from Telecom. A typical configuration is shown in Figure 2.

If the circuit was used (for example) for a leased telephone circuit, the Aussat component is $A8000 a year. With a high-end cost of $A1500 for each of the tails, the end-to-end circuit cost may be $A11,000 a year. The breakeven between leasing a full time Aussat circuit and STD use is readily calculated to be about one and a half hours per day over intercapital routes — in general, if a business averages more than about two hours traffic between two cities it should consider installing either Telecom or Aussat tie lines.

Note that Aussat charges the same tariff between any two capital cities. The price for a leased Sydney to Melbourne circuit is virtually the same as a leased circuit from Brisbane to Perth. This is because satellites are distance independent — short distance circuits cost the same as long distance circuits. As this is not true of terrestrial circuits, one could anticipate a crossover point where circuits of more than a certain length are cheaper via satellite.

In the largely deregulated US market, a general rule of thumb appears to be that satellites are fundamentally cheaper for circuits over 1000km in length. A similar price break appears to be true in Australia. Table 1 shows a comparison of typical Aussat and Telecom prices (as of February 1985) for voice grade leased lines on selected routes.

Note that these prices are based on use of Aussat Major City Earth Stations. Variations in the distance from the customer premises and the MCES mean the Aussat prices including tails are plus or minus $A500.

When users contemplate the use of privately-owned earth stations, other cost comparisons need to be considered. Capital costs are involved, but recurrent annual charges may drop dramatically. Vendors of earth stations can offer equipment which exploits the exact, custom requirements of users' networks.

The truism about satellites being cheaper than terrestrial for long distance circuits only no longer applies. For example, low speed data earth stations (such as are used for Automatic Teller Machines or Point of Sale) may be cheaper than terrestrial circuits for distances as short as 40km, whereas lightly loaded voice (telephony) earth stations may need routes thousands of kilometres long to break even with terrestrial circuits.

The supply of earth station equipment is a fiercely competitive market, with different access technologies producing equipment varying over a thousandfold range of costs and capabilities.

Disaster relief

In certain environments, the flexibility of satellite networking is almost irresistible. The portability of satellite equipment is very attractive to mining and exploration companies. By incorporating a small (2.4m) trailer-mounted antenna into their exploration rigs, mining companies can gain immediate access to telephone, data and television services. This is likely to dramatically reshape the way that remote exploration and development activities are performed. This is also true for disaster relief and remote development activities.

A major development in satellite networking is likely to occur in so called small dish services, which implement two-way voice and data services for business users.

They generally implement star networks, where all communication is to and from a central point. This is true for many applications, including central database access. Thus these systems are attractive for retailers, banks, booking offices, and so on. They very cleverly exploit the broadcast capability of satellites.

These systems rely on one large dish at the central site (perhaps adjacent to the host computer) and possibly hundreds of small dishes, typically only one or two metres in diameter, at each user site.

Small dish networks are very cost-effective compared with terrestrial circuits. To give reasonable response time, an organisation may require at least a 1200 bit/sec circuit into every branch office. However, the duty cycle on these terminals may be quite low — only a few per cent.

In a small dish network, possibly hundreds of these low speed circuits can be replaced by one medium speed satellite data circuit. This is because this one circuit is shared by all the remote sites, and they use capacity only when transmitting or receiving. Thus a single 9600 bit/sec satellite circuit could replace hundreds of low duty cycle 1200 bit/sec services — and users will achieve dramatically better performance, particularly when the circuit is lightly loaded and they can "grab" the entire bandwidth.

The central hub station is essentially statistically multiplexing every terminal in the country on to a single channel.

Satellite capacity and small earth stations are quite inexpensive. Vendors are offering small receive/transmit earth stations, equipped with 9600 bit/sec interfaces, for prices starting from about $A15,000. Depending on the duty cycle of the terminal (and hence space segment cost), such networks become cost competitive against terrestrial systems over distances measured in tens of kilometres.

Two-Way Services (includes Space Segment)	Annual ($A)	Monthly ($A)
Voice Channel	8000	667
9.6K-bits/sec Digital Channel	10,000	833
48K-bits/sec Digital Channel	20,000	1,667
2.048M-bits/sec Digital Channel	195,000	16,250

Figure 1: Published prices for full-time leased circuits through earth stations.

Route	Distance (Km)	Telecom Terrestrial ($A pa)	Satellite ($A pa)
Sydney-Melbourne	718	11,242	11,000
Sydney-Adelaide	1175	15,732	11,000
Sydney-Perth	3331	22,375	11,000

Table 1: Typical Aussat and Telecom prices compared.

Serious rival for fax

(Continued from page 11)

the problem of the receiving station being engaged. It can interwork with the telex network, and can use Telememo.

Being computer controlled, teletex can automatically transmit computer and word processing created information, including both numerical data and text.

Teletex will also have the advantage of being potentially much cheaper. An average A4 page document, containing 400 words, would contain 3.2K-bits when stored as image at the standard Group 3 resolution. This would be reduced by compression to 180K-bits, but this is still between 40 and 50 times the data required to transmit the same document as text.

Group 3 facsimile can operate at 9600 bits/sec, compared with 2400 bits/sec for teletex. As the transmission is tariffed purely on time, the facsimile option will cost 10 to 20 times more than teletex.

Interworking between the two has some possibilities.

Because each technology has its own special applications, both will have a place in the communications of the years to come. A future enhancement to teletex will include transmission of image, in effect a combination of the two, although you will not see that next year.

By the end of the year, there will be about 40,000 facsimile machines in Australia, and only a few thousand teletex terminals. Whatever, the outcome of this battle, both technologies have a long future, and both will reduce, at first gradually, but in time considerably, the use of telex, mail and courier services in world business. And the sooner today's business gets into them, the better.

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Disquiet in high places

By Tom Amos

OVER the past few months discussion in the communications area has centred on the impact in Australia of transborder data flows. It could be seen as the egg quota problem with a whole new twist. Database information, remote computer aided design, movement of corporate reporting are all possible examples of transborder data flow.

Transborder data flow involves the electronic shipping of information across physical boundaries instead of the movement of hard items we have been used to in the past. A product of a modern age, the movement by non physical means opens up a whole new raft of government interest and disquiet. Hark back, if you will, to the restrictions on imports and exports of physical goods that has characterised the Australian society since its beginning.

The use of electronic means for import and export of goods is totally outside the current system. Borders are characterised by physical check points or blocks, entrance points to the nation, with the nation's roads, highways and airways utilised as the transportation media.

Telecommunications, communications at a distance, has come to such a stage in the development of electronic roads and highways that most information goods or items can be now easily carried using these electronic highways. Speed to the front, it only takes a flash at near the speed of light and the information which once took days or weeks to send and receive in hard copy form is now transferred. Big deal?

Such technology is now commonplace in Australia and is provided by our common carriers and privately. But there is a new interest, not directly in the actual message, but in what information such a message can contain and the effect of such information on the Australian people.

New ball game

In the past, with the penny post philosophy, successive legislators have managed to incorporate new technological development in the information transmission field into government-owned monopolies such as Telecom and the Post Office. Now, to control the flow of information is one thing but the content and effect of the information carried — that is a whole new ball game.

The stage may be set for an information transmission structure which will create countries which are information rich and poor: a new class structure could evolve. Such dramatic changes may result from future transborder data flow causes and effect.

To reduce your confusion, consider this modern day example of cause and effect of information flow. Large international corporations operate on a worldwide scale and some utilise information flow between countries to ascertain corporate performance, make investment decisions, keep records and centralise expertise. These are identification of but a few applications of corporate information collection and dissemination. Good information, if the business is information and market-based, usually can be translated into good and timely decisions. It can also be directly translated in some cases into opportunities in distant markets and subsequently more goods sold. Each piece of information, if it crosses the territorial boundaries, can thus be classified as transborder data flow.

The very fabric of society of the future may well depend upon information. The use and location of such information can create or destroy corporate aspirations, profits and local employment.

Transborder data flow can be simply related to the movement of such information. Hardly a worrying subject yet the Department of Communication, the DOC, commissioned a study on the subject last year. Why? To determine efforts, aspects and policies it wishes to apply to our common carriers.

The winds of change are blowing in the international telecommunications area with the flow on of the deregulation of carriage in the US spilling into the international areas. The once sacrosanct agreement of cross-subsidisation between rich and poor countries via the Intelsat cartel is now at risk with the US licensing such corporation as Hughes (General Motors) to be international carriers essentially in competition with the existing sanctioned signatory to Intelsat (Comsat).

Large corporations, if they now have information flows which are also large can, outside the cartel, deal direct with such new carriers and on the major routes avoid the cross-subsidisation now being applied on the official routes. Direct delivery to on-premises devices and the establishing of private global communication systems with cost-related pricing are tangible benefits to those corporations that participate.

Transborder data flow takes on a new meaning in this light as those same corporations provide a large percentage of the carriage for the monopolies which in turn use this to cross-subsidise low return social services. The old agreements and wounds on redistribution of wealth, social services and so on, apply at an international level. Whether this is a benefit for Australia and Australian corporations is dubious. Our ability to effect any change in direction is even more questionable.

The pursuit of better bottom lines may inexorably drive on non-cross-subsidised solutions.

The confused DOC study covered such areas as establishing the Australian based carriers to do exactly what is now occurring in the US, but only in our sphere of influence while it condemned the US moves and advocated protection of our carriers for the good of the Australian people. Forget the rest, just Australia. Regulate and relax.

It should be remembered today that the vast majority of international services are voice-based with data representing only a small percentage. The future ratios may change and as recipients of a cross-benefit, so may the benefits.

Back to the data flow. Employment in information based industries could conceivably be affected by either the restrictions or cost effective access to information databases. No hard evidence has been uncovered to support any premise but a likely scenario exists in this area.

So in corporate Australia those international companies that wish to participate in the information dissemination process may be compelled to access such information via the government in the interests of the people. Technical services and other pressures will ensure this initial scenario.

But what happens if, for example, information is broadcast to Asia and Australia is excluded from entering the international scene. Will reception be a crime?

Will such fortuitous reception be seen as just that? Will wireless sets be a barrier to freedom? It remains to be seen whether our values extend that far.

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FOXY

Pro-OSI lobby in full flight

(Continued from page 9)

add a further seven operating systems and a further four vendors.

Csironet has invested a great deal of effort over the years in devising ways to interconnect unlike equipment, and is a recognised leader in this field. However, the lesson regarding the cost of such activities has been well learnt. Because future interconnection demands were foreseen as expanding uncontrollably, Csironet perceived OSI at an early stage as probably the only hope in economically dealing with the future interconnection explosion.

Csironet therefore adopted OSI as a R&D area. An active participation in the national and international standards development activities commenced, and an active collaborative programme with Telecom Research Laboratories was built up. Csironet concentrated its involvement in the upper 4 OSI layers, that is the end-system layers, as opposed to the transmission-system layers.

One OSI area on which Csironet has concentrated in the past four years is FTAM. File transfer is a very important application on the Csironet network. Data files are moved very frequently between the many different computers. Files are also moved continually between the host computers and the 100-odd batch input/output stations, and between host computers and user microcomputers, etc.

File transfer between unlike systems is fraught with difficulties, coping with, for example, differing data representations, differing formatting conventions, and differing file structures. There has not even been a solid de facto standard in this area.

OSI FTAM was therefore a particularly attractive prospect. Pending the advent of OSI, Csironet implemented an interim host-independent network-wide file transfer system, CNFTS. Plans are now in place to migrate CNFTS protocols to OSI FTAM.

The Csironet involvement in FTAM extended to its hosting the November 1985 international meeting of the ISO FTAM editing group in Canberra. This was a key meeting in the progression of the FTAM standards, as it succeeded in resolving the bulk of the objections raised in the preceding international ballot on FTAM, paving the way for progression to DIS.

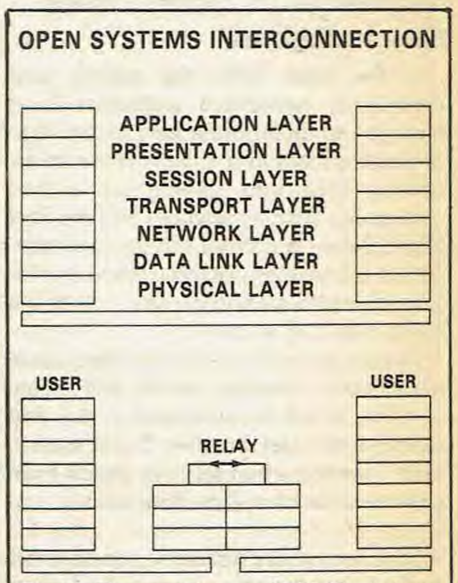
The imminence of OSI, and its likely impact in Australia, were the subject of another important gathering convened by Csironet in Canberra in November. This was the Government-Industry Workshop on the Introduction of OSI to Australia, which brought together representatives of key government departments and authorities and industry associations with an interest in OSI.

The workshop included sessions on international perspectives, government/user perspectives, and industry perspectives on OSI. Australian initiatives (past, present, and future) were also described.

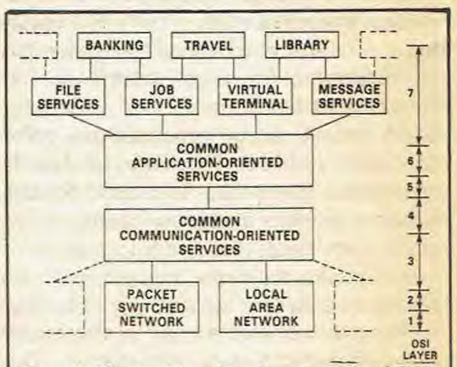
Speakers from overseas included representatives of AT&T and the UK Treasury CCTA. Local speakers included representatives from the Department of Defence, Department of Finance, Australian Software Houses Association, Telecom, CSIRO, and the Department of Industry, Technology, and Commerce.

In an open forum session, discussion centred on two major themes — a proposal for a National Protocol Standards Centre to assist in OSI-related technology transfer to Australian industry and the role OSI should play in government procurement policies. A volume of Workshop Proceedings has been published by (and can still be purchased from) Csironet.

A clear consensus from the workshop was that Australian government and industry cannot afford to sit ignorantly idle while OSI makes its final approach.



Diag 1: The seven layers of OSI. The bottom diagram shows how the lower three OSI layers can support the linking of different networks, regardless of underlying communications technologies. The upper four layers are end-system layers.



Diag 2: The building-block approach of OSI. At the upper levels protocol elements can be put together to suit the needs of different applications. Independently, at the lower levels, a variety of protocols are available depending upon the underlying communications technology.

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Communications-cost can now be cut down considerably by using the Telecoms packet switching (X25) network for 3270 communications rather than leased telephone lines or dial up.

Besides the economical advantages, using X25 offers great technical and operational advantages.

The product TOP25 offers integral SNA/X25 support, combined with 3270 emulation for Personal Computers. TOP25 is a powerful software package, that employs the low-cost IBM SDLC comms board as the hardware interface to connect to AUSTPAC. This means that PCs currently using the IBM 3270 emulation product can be used on AUSTPAC without any hardware enhancement.

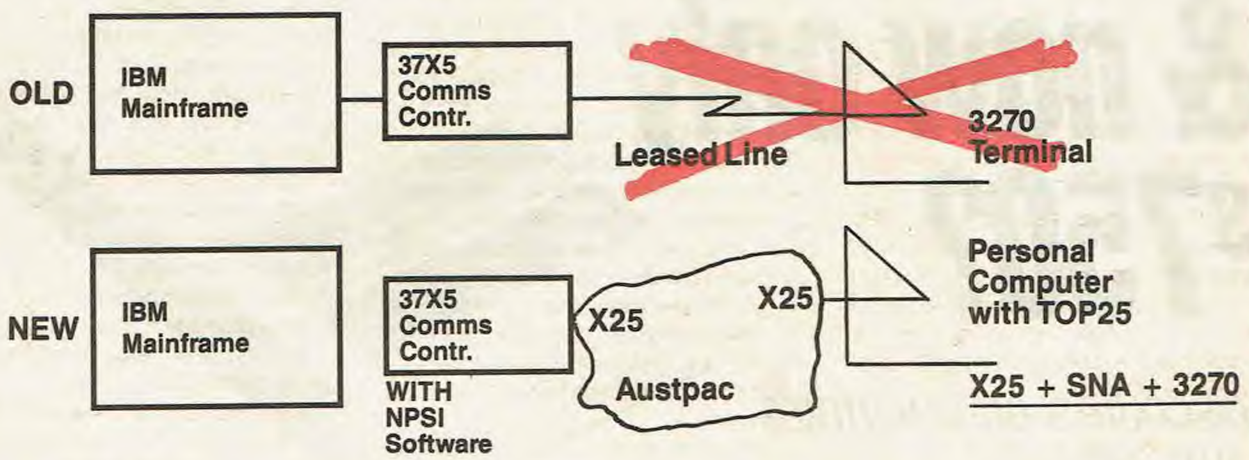
The installations, realised both in Australia and New Zealand are much to the satisfaction of the users. As a result of the direct X25 connection, without costly and time-consuming protocol conversion, excellent response-times are experienced.

In many cases, it will be an advantage to replace the existing 3270 workstation by a Personal Computer, as local computing power is introduced. This opens numerous new possibilities.

However, even in those cases that local processing is not envisaged, the pure fact that the PC can be used as a 3270 workstation with a direct X25 interface, will justify replacement of the 3270 terminal by a PC.

The workstations mainframe link is not "fixed". Other systems may be accessed (even Videotex) via AUSTPAC. New backup possibilities for the mainframe become available via X25.

Unique support arrangements at each technical level can be offered.



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Success starts at the top

By Noel Bennett

IT WAS like being back in the early days of distributed processing; Ian Smith saying success was engendered by support from top management and also, more topical in these days of personal computers, emphasising the necessity of providing comfort and support to clerks and others using the system.

It was also very much like contemporary thinking about computers when Smith spoke about systems being acknowledged as helping to provide a competitive edge in the marketplace.

The difference was that Smith was talking about telecommunications, not about computers *per se*.

These and other observations made by Smith in NRMA headquarters in Clarence St, Sydney, suggest that effective communications managers are making intelligent use of the experience gained from implementing computer systems.

With 10 years' background in EDP, Smith was chosen three years ago to be the first communications manager of the largest motorists' group in Australia.

Smith had no previous experience in the subject, except at university, but this knowledge was "completely out of date".

Smith says he was appointed because he was acquainted with NRMA's business; that is, his top management placed this knowledge above technical expertise, a trend also ocurring in computing.

In the early days of his appointment, NRMA enlisted the aid of outside consultants. Smith was "an apprentice," but the role of these consultants now is to review decisions made rather than to initiate them.

Market oriented

NRMA, through its 3000 staff, looks after the commercial and sectional interests of its members in many ways: besides the familiar road, technical and legal services, it is the largest private general insurance company in Australia and is among the top travel agents in NSW. It also represents the interest of members to governments and other bodies.

The 1985 annual report has the front page statement, "Making technology serve our members," and Smith amplified this by saying "in the past five years . . . NRMA has become much more marketing oriented and sees the need to use technology to provide a competitive edge.

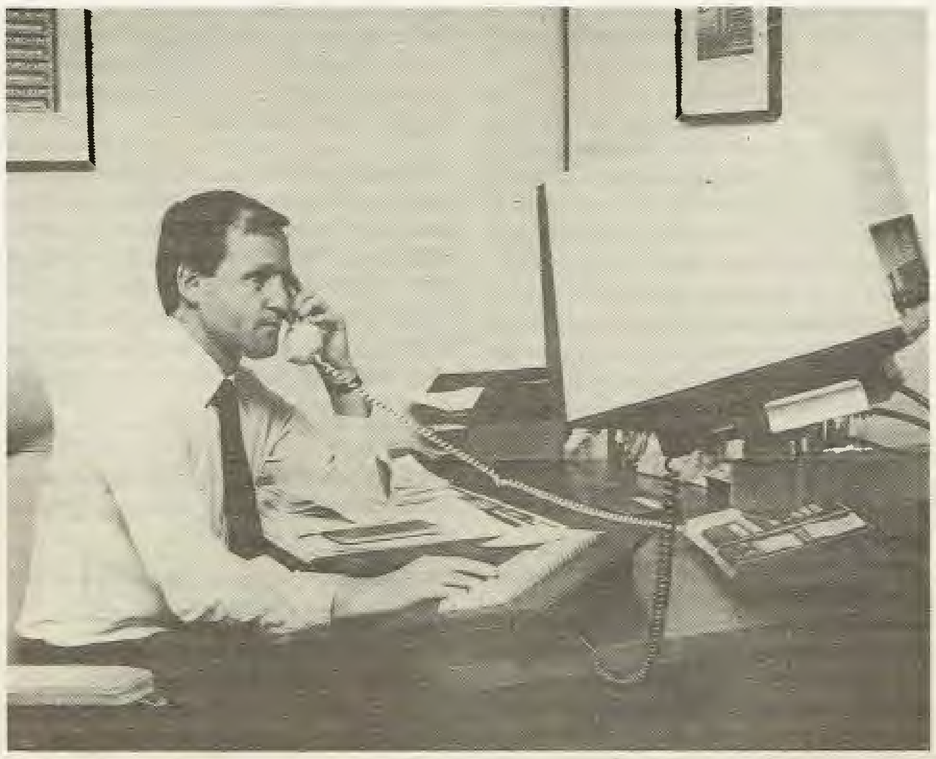
"The NRMA is dependent on the effectiveness and efficiency of its communications services and we have the total commitment of top management."

The NRMA's approximately 1,800,000 members are served by 28 branches in Sydney and the country, as well as by 256 district depots throughout the State, and one of Smith's tasks is to link appropriate regional offices and branches to provide convenient, speedy and trouble-free help to members. Smith is responsible for support of the word processing and data networks. The voice network will be included in his jurisdiction when the Integrated Services Digital Network (ISDN) is fully implemented.

As with so many organisations before the centralisation of responsibility for telecommunications, voice was handled by administration with the property department also having "a finger in the pie".

The data processing online system was configured and co-ordinated by members of the systems programming group in the technical services section.

However, according to Smith, user support for those operating the 100 terminals installed was handled by the operations group who tended to use the traditional approach which was to emphasise "control" of the enduser.



Ian Smith . . . total commitment from top management

Smith said he was guided by the new Information Systems Director, David Riches, who saw his priority as helping the user and enlisting staff who were skilled at understanding their frustrations and general difficulties in coping with the system.

Accordingly, the name of the network control centre was changed to "network support centre". At the same time, the decision was made to help branches become more independent from the head office support team by training people to be the first line of enquiry when users needed help.

There are now about 186 online co-ordinators in the 45 sites — head office, regional offices, branches and district depots — which are now online.

Up to 85 per cent of the problems reported by these co-ordinators to the support centre can be solved over the telephone and the balance, because of problems in lines or equipment or software, are handled by the third level which could be anyone from the communications problem determination group, Telecom, suppliers, mutual support or the Technical Services group.

Smith believes that one of the fundamental issues in the successful implementation of office automation systems is for suppliers fully to recognise and address the human problems involved.

Introduction of such systems must be from the bottom up rather than dictated from the top down, with a framework constructed ensuring that the user is confident about the system rather than a solution "being pushed down his throat".

The NRMA replaced its Wang and IBM equipment with Datapoint products with the association experimenting with electronic mail, diaries, calendaring, telex interfaces and phototypesetting, but not all these applications have been introduced in all departments yet.

On electronic mail, Smith says it is an excellent concept as it goes a long way towards removing barriers to staff communicating among themselves so that everyone concerned knows what is going on, which far outweighs the risk of possible large quantities of "junk mail".

This facet of office automation appears to be working. Smith said that staff without terminals are asking for them, although he does acknowledge that some may just want a terminal as a status symbol.

If office automation is going to be effective then the system must not be just simply grafted on the the old ways of doing business, but these ways must be changed to take the greatest advantage of the new technology, he said.

The heart of any office automation system is the communications infrastructure to obtain synergistic effects which the system is capable of providing. But at the same time, much depends on management, for if they are enthusiastic about high technology then this will filter throughout the organisation as a whole.

This enthusiasm should be kept within bounds, for in some organisations, managers have "gone berserk" with personal computers, ordering units which are not easily compatible with the network.

Liaison officers

Smith said the NRMA employs two network liaison officers to train the network co-ordinators in branches and other sites, four staff work in the network installation support group which instals terminals and configures branches, and three members work in the word processing support group.

Consideration is being given to transferring some of the word processing group to the information centre to analyse users' requirements to help to determine whether the solution lies with conventional DP or whether a personal computer with appropriate software will fill the bill.

The main network support centre is also becoming more important with the increasing emphasis on information flow, and while it may not be easy to accomplish, Smith says the intention is to integrate the various forms of information, data, text, voice and facsimile horizontally rather than vertically so that one group would be responsible for all these information transmissions.

This path is being followed as the network is "rapidly" becoming the heart of NRMA's operations and a common ground is required to get the most out of it in terms of economy and efficiency.

Further, fragmentation of responsibility could cause confusion, with the user, not knowing where to go to for help.

An added bonus is that by having all network problems coming into one section, it can be determined whether a fundamental problem exists which is affecting many users, and so resources can be dedicated towards solving it.

Technically, the association last year placed an order in the region of $A4 million with Plessey Pacific Telecommunications to instal the first private ISDN network in Australia. This will connect NRMA establishments throughout the Sydney metropolitan area and regional centres in Newcastle, Wollongong and Canberra.

The 24 integrated services digital exchanges (ISDX's) will be linked together, so allowing anyone calling the NRMA to be transferred between these equipped centres at the touch of a button. This transfer will be effected in the same way as a person would be transferred from one extension to another on a private exchange.

Internal traffic will be able to be transmitted with similar ease. Giving the background to this decision, Smith says senior management saw the need to improve the interface with members over the telephone. Surveys had shown that this interface was worsening with members having to wait for longer periods or being connected to the wrong party.

Smith was called into a conference at which the senior managers involved said they wanted to remove the telephone functions from the branches, where it was difficult for staff to serve members at the counter while simultaneously trying to answer telephone calls. One consequence was that the caller could be left "hanging" for an unreasonable time before the call was answered.

Avoiding transfer

One solution could have been employing more staff at each branch, but this would have meant much heavier staffing costs.

The next requirement was to improve the likelihood that the first employee to answer the phone would be the one best able to service the member, and so avoid the caller being transferred.

However, if the recipient of a call is not the best employee to serve the member, then the call should be transferrable to the appropriate person no matter where he or she was. This implied a distributed network.

The management team also required that any employee could contact another directly and without an operator intervening.

The emphasis was on making life easier for the member and at the same time, helping to reduce the bureaucratic element in the association.

Telephone traffic had been increasing rapidly for the past five years and the association had been "bandaiding" the problem for the past three. Smith subsequently advised that with an ISDN system, the telephone function could be removed from branches with calls being funnelled into the nearest enquiry centre in Sydney at either Blacktown, Hurstville, Chatswood or the city. The network would be completely transparent.

At the same time it was decided to set a standard whereby 90 per cent of the calls would be answered within 15 seconds.

With voice traffic being digitised, Smith said management will have an "interesting" time in coming to terms with all the new facilities available on the telephone handsets.

The key to obtaining co-operation in a period of change is to demonstrate the

(Continued page 30)

‘ The NRMA is dependent on the effectiveness and efficiency of its communications services and we have the total commitment of top management ’

Quick trouble-shooting from Comstate II

NORTH RYDE, NSW — Datamatic has announced an advanced SNA protocol trace capability now available for the Comstate II Protocol Analyser. The Comstate II decodes this complex protocol real time and reduces the time it takes to troubleshoot an SNA link.

The trace display, Comstate II represents a clear, detailed picture of IBM's SNA protocol. It decodes the SNA protocol for the operator. Translation charts or manuals are no longer needed because the code translations are built into the Comstate II. The operator simply makes a couple of menu selections. The user can flip back and forth between the raw data display and the decoded SNA screen with the push of a key.

The Comstate II also provides advanced testing capabilities for SNA; it analyses and emulates SDLC, HDLC, X.25, Anyn, Bisynch and Isoc.

Datamatic Pty Ltd, 9 Byfield Street, N Ryde, NSW 2113. Tel: (02) 888 1788.

Telex encryptor made for home market

PERTH — Encryption and security specialist, Ran Data Corp Ltd has expanded its range of devices with the introduction of a telex encryption product.

The Telex Encryptor (designed and manufactured in Australia) is the first product of its kind ever to be offered in this country, a company spokesman claimed.

Designed specifically for current loop telex machines, the Telex Encryptor uses the Ran Data Entropic Key Encryption System — a proprietary algorithm.

A telex operator can specify at the beginning of the transmission whether or not the message will be encrypted. If no encryption is required, message transmission proceeds as normal.

The encrypted message can only be accepted by the recipient if a "master key" match occurs.

The telex encryptor costs $A3000 and can be installed in less than a minute.

Ran Data Corp Ltd, 12 Victoria Ave, Perth, WA 6000. Tel: (09) 325 2400.

Error Free message by Shuttle Datacomm

MELBOURNE — Shuttle Datacomm has released Error Free, a device that is said to enable accurate high-speed communication between computers not sharing identical software and over telephone links that are less than perfect.

Placed between an asynchronous terminal and modem, the Error Free provides error-free transmission at data rates of 300, 1200 and 2400 bits/sec using a complex MNP error-checking technique that involves block transmission, Cyclic Redundancy Character (CR) checking, and data retransmission if an error is detected.

The Error Free is equipped with a set of DIP switches so power-up parameters can be tailored to a particular application. Switch settings can be changed without having to reset the system.

R F Computer Communications Pty Ltd, 456 St Kilda Rd, Melbourne, Vic 3004. Tel: (03) 267 1011.

High-speed fibre optic link to peripherals

WATERLOO, NSW — A fibre optic communication system designed to ensure fast, accurate data transfer between peripherals and their host computer, has been released by Centec International Pty Ltd.

Originally intended to overcome electrical interference problems encountered with microcomputer local area networks, the Centec high-speed link system is equally applicable to such applications as data logging or industrial control systems.

Developed by Centec, High Speed Link is compatible with RS232C, RS422 and RS423 interfaces. It is available in two configurations, one for communicating over distances up to about 30m, the other for distances as far as 2km.

Centec's link comprises two mains powered units (one at the computer, the other at the terminal or other device): communication between the two units is via a 5mm diameter, low-loss optic cable.

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Success starts at the top

(Continued from page 29)

comparative simplicity of the system and the benefits it can bring. One subtle way of securing this co-operation is to choose personnel most receptive to innovation, get them on to the system, so other employees can see how easy the system is, and virtually persuade themselves that it is worthwhile.

At present, data links are provided by Telecom's Digital Data Service (DDS), but when the ISDX's are in place, within about 12 to 18 months, this network will also carry voice and data on links provided by Telecom's 2M-bit/sec Megastream service.

Smith says the NRMA is examining Aussat's offerings for possible contingency purposes.

The NRMA's well-known "life-saver' road service operates through an entirely different network. Four base stations around Sydney are connected by microwave, and then distribute, under computer control, voice and data via UHF to the 385 patrol vehicles.

On the particular problems he faces, Smith says one of the biggest is not being aware of what is actually happening. "It is too easy to isolate yourself and then concentrate on solving the wrong problem," he says.

"I have to fight to get out to talk to users by preventing myself from putting it (visits) off and keeping it on the priority list."

He said his job was becoming more and more involved with managing, with no time to get into the nuts and bolts of systems, apart from considering their overall usefulness, particularly to members. More stress was being placed on the cost of alternative services.

"If our users are happy, does it matter whether the system is elegant?" Smith asked.

"But at the same time you have to invest money in projects which satisfy the needs of endusers and then they will give you credibility and come and ask about how their problems can be solved."

Smith again stressed the need for cooperation with endusers, something David Riches has emphasised from the beginning. Any attempt to impose a system will end in failure. The users work out a cost justification for a system and if it is approved, the communications department is involved with the Information Services department to provide the most appropriate tool.

"The use of technology, of which communications is an integral part, provides a competitive edge," Smith reiterated. "There are no two ways about it."

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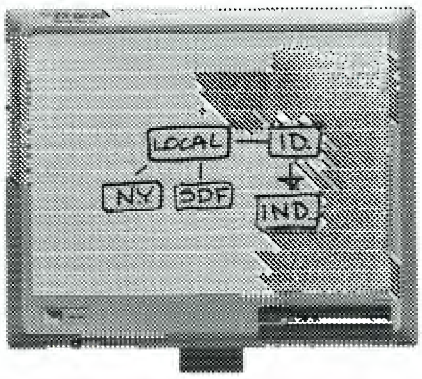

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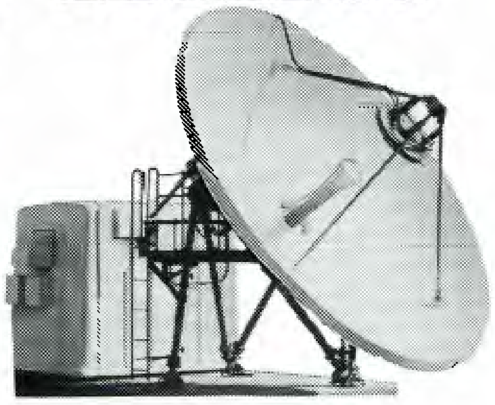

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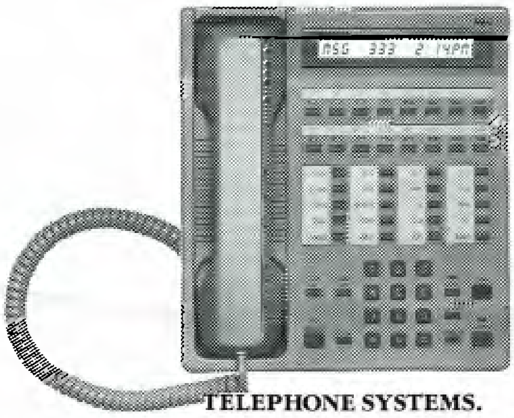

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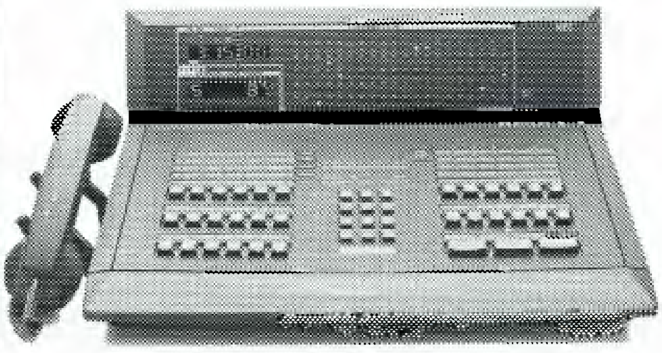

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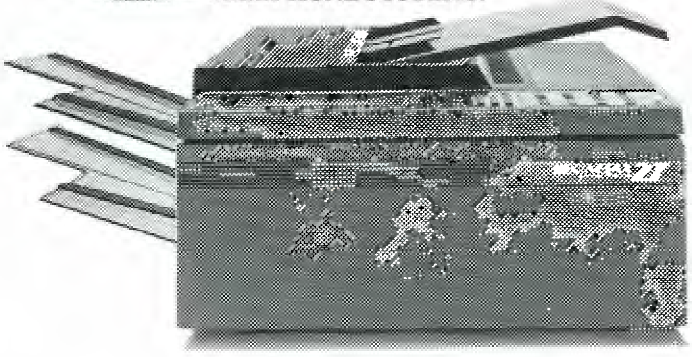

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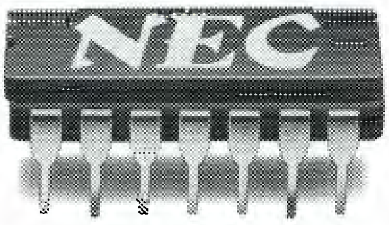

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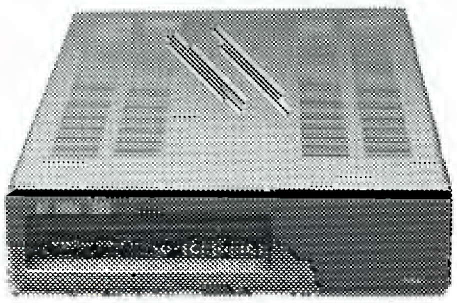
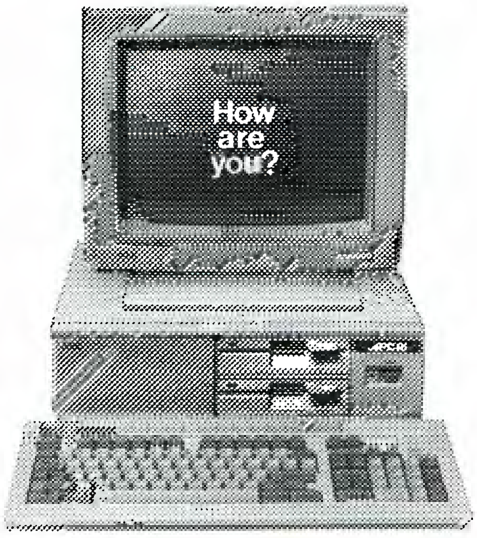


DATA TRANSMISSION.



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